

AXIA IAS ACADEMY



**DAILY NEWS
ANALYSIS**



AUGUST 31



**CONSISTENT
COMPREHENSIVE
AND CREDIBLE**



**UNIQUE AND BEST IN
QUALITY**





AXIA
IAS ACADEMY
RISE ABOVE THE REST



UPSC CSE CLASSES - PRELIMS + MAINS + INTERVIEW GUIDANCE

- **EXPERT FACULTY & MENTORSHIP**
- **COMPREHENSIVE STUDY MATERIAL**
- **REGULAR TEST SERIES & EVALUATION**
- **CURRENT AFFAIRS & ANSWER WRITING FOCUS**
- **SMALL BATCH SIZES FOR PERSONAL ATTENTION**

axiaiasacademy.com +91 6002-417488

OBC creamy layer and the income test

Why is the Centre finding the ruling difficult to implement? What exactly did the Supreme Court rule on the creamy layer? Why is the Centre seeking clarification? What are its concerns over implementing the ruling? What happens next in the creamy layer case?

EXPLAINER

Aditya Lakshman

The story so far:

The Supreme Court has said it will consider setting up a bench to hear the Centre's application seeking clarification over its March 8 judgement on the income test component of the OBC creamy layer exclusion criteria. Anticipating implementing the judgement on the income wealth test for OBC creamy layer determination is "extremely difficult" and will cause a "lasting effect" within certain sections, 200-250 seats, with the impact extending to "all categories, including the Unreserved category", the Centre said in a batch of applications.

Why does the Centre call the ruling "extremely difficult" to implement?

The Supreme Court on March 8 delivered its judgement in a batch of cases pending for close to a decade, relating to how the Department of Personnel and Training (DoPT) should interpret the crucial income wealth test, which is one of the factors through which the "creamy layer" is identified. The Centre's argument is that the ruling is "extremely difficult" and will cause a "lasting effect" within certain sections, 200-250 seats, with the impact extending to "all categories, including the Unreserved category". The Centre said in a batch of applications.

The cases that eventually came before the court involved claims by or for OBC candidates who had appeared in Civil Services Examination (CSE) since 2012 and were excluded from consideration for an OBC reserved post after the DoPT classified them as part of the creamy layer, which based on their parents' income.

The Supreme Court found that the DoPT was incorrectly applying the income test to this category of OBC candidates and directed the government to create supplementary points for the OBC candidates to whom the income test had been applied with effect to "North discrimination", and after their services according to their valid claim irrespective of CSE posts.

What are the criteria for exclusion?

The creamy layer concept among OBCs emerged from the Supreme Court's 2002 ruling in the Indra Sawhney case, which permitted top for the implementation of OBC reservations. The idea was to exclude OBC candidates whose families had no combined social and economic privileges over the years from the benefits of reservation. Such candidates came to be described as belonging to the "creamy layer".

To clarify which categories of OBC candidates would fall under the creamy layer, the DoPT issued an Office Memorandum (OM), a guiding charter in September 2002, laying down the criteria for exclusion.

The OM prescribed several categories of exclusion, including children of senior constitutional, judicial, government and armed forces officers.

Besides this, the DoPT also prescribed a test of income or wealth test, applicable to people to the selected professional class or regarded as such: people holding positions, vacant land and/or buildings in urban areas, and people whose parents held posts in Central or State PUs or whose the occupations of these posts with government service posts had not yet been established. It is this last category that is, children of parents holding posts in Central or State PUs or in private employment, that the Centre delivered to March 8 judgement.



What was the problem with the 2002 OM and 2014 letter?

Under the 2002 DoPT OM on the income wealth test for OBC reservation, a candidate would be considered part of the creamy layer if their parents' gross family income exceeded the prescribed limit for three consecutive years, or if they possessed wealth above the exemption limit prescribed under the Wealth Tax Act, 1957. The income limit, which was 10 lakh when the 2002 OM was issued, was revised several times and now stands at 10 lakh, with the last revision having come in 2017. Importantly, the 2002 DoPT OM specified that income from salaries and agricultural land should be included when applying the income wealth test, with income from other sources such as property, business, or capital gains being considered.

However, in October 2014, the DoPT issued a letter meant to clarify issues that had arisen in implementing the 2002 OM. In paragraph 8 of this letter, the DoPT took up the issue of how to calculate income for the income wealth test for OBCs, whose parents were in Central or State PUs whose occupations of posts had not yet been established. The DoPT seemed to suggest that income from salaries was to be considered to determine if the income was above the prescribed threshold for three consecutive years. The threshold was subsequently revised to 10 lakh per year in 2017.

In the 2018 ruling, the Division Bench noted that until the government establishes equivalence between the posts of Central or State PUs and government services, the income wealth test must continue to apply equally.

How did the Supreme Court interpret the income test?

The March 8 Court of India in *Indira Nehru* judgement said that OBC candidates whose parents work in PUs or in private sector, where the government has yet to establish equivalence of posts with government services, cannot be treated differently from OBC candidates in other categories under the creamy layer exclusion criteria. Significantly, the Supreme Court ruled that the income wealth test component of the exclusion criteria must be seen and operated as a "standalone" test, adding that salaries and significant incomes had been consistently left out while applying this test under the 2002 OM. The court noted that while the 2002 OM was clear about excluding income from salaries from the calculation of the income wealth test, the 2014 letter appeared to call for its inclusion in circumstances that were

not clearly specified.

The court went on to note that the interpretation of the 2002 OM, read with the 2014 letter, had led to "North discrimination", but since the children of those in government service and those in PUs or private employment.

Without establishing equivalence of posts, the income test, including salaries, was being applied to rule out OBC candidates whose parents were in government service and those being subjected to a test that did not include salaries. This is what the court had described as "North discrimination".

The court said, "Treating the children of those employed in PUs or private employment, etc., as being excluded from the benefits of reservation solely on the basis of their income derived from salaries, and without reference to their parents' Group A or B or Group C or D would certainly lead to North discrimination between parties who are similarly placed and would amount to equal being treated unequally."

The court had directed the Centre to implement this ruling of the income test within six months by creating supplementary points for the professions, occupations, etc., as being excluded from the benefits of reservation solely on the basis of their income derived from salaries, and without reference to their parents' salaries alone.

The parents were working in public sector undertakings of the private sector.

Did the Centre try to implement the Supreme Court's directions?

The Supreme Court's ruling in the *Indira Nehru* case was a watershed moment for the category of OBCs, who had said that the issue had been pending for more than a decade. As per the Supreme Court's directions, the Union government was supposed to issue further instructions in pursuance of the court's ruling of the income test component — so how the supplementary points must be created and how the existing strength of the meritorious must be adjusted to accommodate them.

According to government records, the Union Ministry of Personnel, Promotion and Public Grievances went to the Ministry of Social Justice and Empowerment on June 12, seeking advice on implementing the directions of the *Indira Nehru* judgement. The Personnel Ministry told the Social Justice and Empowerment that the Directorate of Business Rules provide for the Social Justice Ministry to consider public sector vacancies and that it has already seeking

"Application in form" in this regard. The Personnel Ministry further sought advice on instructions to be adopted or modified by the DoPT.

In August 15, the Centre's position before the Central Administrative Tribunal in a matter almost identical to that of the *Indira Nehru* case, a petition in the *Indira Nehru* case was that it was in the process of implementing the March 8 judgement.

However, a few days later, the DoPT filed an application highlighting why it was extremely impossible to follow the Supreme Court's directions and the Centre that was seeking to implement them retrospectively. In this application, the Centre said that despite its efforts to create the supplementary points as called for in the *Indira Nehru* judgement, it was facing an increasing number of claims for adjustment, issues of seniority arising from such adjustments, and concerns that even this exercise could be "nullified" in a different category of OBC candidates and candidates of "all categories, including the unreserved category".

The Centre stated that since the March 8 judgement, 12 other judgements have been issued by courts applying the principles laid out in *Indira Nehru*. In addition, the DoPT said that 1,000 cases have been filed seeking reconsideration of OBC reservation issue under the *Indira Nehru* principles. In candidates who had not previously approached the courts.

However, OBC candidates who spoke to the Hindu argued that the Centre's reluctance to implement the directions does not appear to make sense. They said candidates have asked why the DoPT had not mentioned these larger issues with implementation earlier.

These candidates have noted that the older reading of the income test — the one that the court said amounted to "North discrimination" — was being applied only by the DoPT, and that too arbitrarily.

What happens next?

Along with the application that the DoPT has filed setting out the difficulties it was facing in implementing the *Indira Nehru* judgement's directions, especially retrospectively, the Union government had filed a separate application, stating that it be allowed to continue shifting services as per the old reading of the income test for OBC 2012 candidates, and seeking clarification on how to implement the directions. The Centre said that since then 200-250 OBC 2012 candidates were about the size that Parliamentarians and they had been recommended based on the old reading of the income test.

The DoPT argued, in this application, that the retrospective application of the judgment was specifically focusing into the income test component.

The Supreme Court has now said it will consider setting up a bench to hear the Centre's request for clarification on how to implement its directions and to suggest to allow the adjustment of services to OBC 2012 candidates to continue as called for by the law being.

However, in the other application filed along with this, the Centre has asked for clarification on how to implement the directions overall. It has further argued that there might be some value in including income from salaries, as it comes under the "sole intelligible difference" between two OBC candidates from "similar social background". It has also argued that, in the absence of salary consideration, some cases might lead to OBC candidates with parents earning up to 10 crore being considered non-creamy layer.

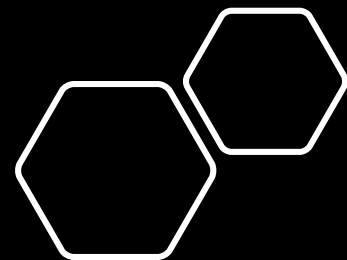
Thus, the question is how far will the Supreme Court's March 8 verdict reach?

THE GIST

• The Supreme Court's March 8 judgement that salary income should not be used to exclude OBC candidates from the creamy layer where their parents were in PUs or private employment without establishing equivalence of posts with government services.

• The Centre's plea for retrospective implementation could have a lasting effect on central services, where backlog exists more than a decade since the Supreme Court's 2002 ruling.

• The Supreme Court will consider setting up a bench to hear the Centre's application seeking clarification on how to implement the ruling, including its application to OBC 2012 candidates.



- **Key Terms and Explanations**
 - **Other Backward Classes (OBC):** Socially and educationally backward communities identified under Article 340 of the Constitution and evaluated by the National Commission for Backward Classes (NCBC). Unlike Scheduled Castes (SC) and Scheduled Tribes (ST), OBC reservations are subject to socio-economic filters to ensure benefits reach non-privileged segments.
 - **Creamy Layer:** A constitutional mechanism introduced to exclude socially, educationally, and economically advanced members of backward classes from reservation benefits. *Example:* Children of high-ranking constitutional authorities or senior Class-I officers are excluded to prevent affluent families within backward classes from monopolizing affirmative action.
 - **Income/Wealth Test:** A financial threshold acting as a residual eligibility filter. Under the 1993 Department of Personnel and Training (DoPT) Office Memorandum (OM), families with an annual gross income exceeding ₹8 lakh (revised periodically from ₹1 lakh in 1993) for three consecutive years fall into the creamy layer.
 - **Exclusion of Salary and Agricultural Income:** The rule under the 1993 DoPT OM mandating that regular salaried earnings and agricultural income must not be computed when calculating the financial threshold; only income from business, property, trade, or capital gains is assessed.
 - **Equivalence of Posts:** The formal administrative benchmarking of job hierarchies in Public Sector Undertakings (PSUs), nationalized banks, autonomous bodies, and private corporations against standard Central Government service rankings (Group A, B, C, D).
 - **Hostile Discrimination (Article 14):** An unequal application of executive rules between similarly situated individuals without an intelligible differentia, violating the constitutional guarantee of equality before the law.
 - **Supernumerary Posts:** Specially created administrative vacancies sanctioning employment above the regular cadre strength to grant relief to candidates wrongly denied selection without disrupting already appointed candidates.
- **Main Arguments and Substantive Parts**
 - The structural tension within the OBC reservation framework centers on whether the income test should treat salaried employees in the public sector identically to those in the private or unbenchmarked PSU sectors.
 - **The Constitutional Mandate of Indra Sawhney:** The Supreme Court in 1992 (*Indra Sawhney v. Union of India*) affirmed that affirmative action is designed to address social backwardness rather than mere economic hardship. The creamy layer was conceptualized primarily on the basis of social status, with income serving only as an indicator of advanced status.
 - **The Structural Flaw of the 2004 DoPT Letter:** Under the 1993 OM, the creamy layer determination for government employees rested on parental rank (status test), while their salary remained excluded from the income test. For PSU and private sector employees, the government was tasked with establishing post-equivalence. Due to executive inertia in defining this equivalence, the DoPT issued a clarification in 2004 suggesting that salaries of non-government employees would be computed toward the income test.
 - **Judicial Finding of "Hostile Discrimination":** In *Union of India vs Rohith Nathan (2024)*, the Supreme Court held that subjecting the children of PSU and private employees to an income test that includes salary—while exempting government employees' salaries—creates arbitrary inequality. The court affirmed that salary and agricultural income must be excluded across all sectors until formal post-equivalence is notified.
 - **The Union Government's Administrative Dilemma:** The Union Government filed for clarification, highlighting that applying this ruling retrospectively back to 2012 would trigger an administrative cascade. Readjusting settled service allocations, re-ranking batches, and re-allocating unreserved vacancies disrupts cadre stability.
 - **The High-Income Anomaly:** The DoPT argued that completely excluding private sector salaries in the absence of post-equivalence creates a reverse anomaly where children of corporate executives earning over ₹1 crore could secure non-creamy layer status, defeating the underlying logic of the creamy layer.

- **Historical Evolution of the Issue**

- **1953–1980 (The Commission Era):** The Kaka Kalelkar Commission first attempted to define backwardness through caste hierarchies. In 1979, the Mandal Commission was established, recommending a 27% quota for OBCs in Union civil services and public enterprises, relying on social, educational, and economic indicators.
- **1992 (The Indra Sawhney Framework):** A nine-judge Constitution Bench upheld the 27% OBC quota while introducing the mandatory exclusion of the "Creamy Layer". The court ruled that total reservations should not exceed 50% and directed the formulation of specific criteria to identify advanced OBC individuals.
- **1993 (The Foundational Office Memorandum):** Based on the Justice Ram Nandan Committee recommendations, the DoPT issued the September 1993 OM. It instituted a multi-tier exclusion model:
 - Constitutional posts (President, Judges, UPSC members).
 - Direct Group A / Class I officers (and Group B under specified conditions).
 - Equivalence principle for PSUs, banks, and universities.
 - Residual Income/Wealth Test (excluding salary and agricultural income).
- **2004 (The Executive Deviation):** Addressing ambiguities regarding unmapped PSU positions, the DoPT issued its October 2004 circular. Paragraph 9 of this letter altered the application by including parental salaries of PSU and private employees within the income threshold, setting off two decades of litigation.
- **1993–2017 (Ceiling Adjustments):** The income threshold was periodically adjusted to account for inflation: ₹1 lakh (1993) → ₹2.5 lakh (2004) → ₹4.5 lakh (2008) → ₹6 lakh (2013) → ₹8 lakh (2017).
- **2024–2026 (The Rohith Nathan Ruling and Reconsideration):** The Supreme Court struck down the differential calculation method used by the DoPT and ordered the creation of supernumerary posts for affected candidates. The Union Government subsequently sought a review citing broad administrative disruptions across settled civil services batches.

- **Way Forward**

- **Formalize Comprehensive Post-Equivalence:** The Union Government must constitute an inter-ministerial expert committee comprising the DoPT, Department of Public Enterprises (DPE), Indian Banks' Association (IBA), and the NCBC to draft an exhaustive post-equivalence manual mapping PSU, public sector bank, and autonomous body designations to Central Government Group A–D grades.
- **Establish a Clear Private Sector Assessment Framework:** To address the anomaly of high-earning private sector executives exploiting the exclusion of salary income, create an income-tax-linked benchmark (e.g., assessing parental Cost-to-Company (CTC) against standard Group A entry pay scales) that isolates elite private earners without penalizing lower-middle-class private employees.
- **Index the Income Ceiling to Inflation:** Shift the income criteria from ad-hoc, politically contingent revisions to an automated formula linked to the Consumer Price Index (CPI) or Cost Inflation Index (CII), updated every three years as envisioned in the original 1993 OM.
- **Calibrate Administrative Remedies:** To prevent disruptions to settled civil service cadres while complying with judicial mandates, implement prospective structural reforms alongside supernumerary adjustments for demonstrably wronged candidates, preserving cadre stability.
- **Deploy an Integrated Verification Portal:** Establish an API-linked national portal connecting the NCBC, state revenue authorities, and the Central Board of Direct Taxes (CBDT) to verify OBC Non-Creamy Layer (OBC-NCL) certificates against asset and direct-tax filings, eliminating administrative discretion and regional disparities.

A COMPREHENSIVE ANALYSIS: THE OBC CREAMY LAYER AND THE INCOME TEST

Presents

DEFINING THE CORE: Key Terms and Criteria



OBC

- Conceptual filter: OBC Intended of prevents co-optations of OBC

CREAMY LAYER (Affluent Exclusion)

- Affluent exclusion of affluent and substantiation and, creamy layers

INCOME TEST

- ₹8 Lakh Threshold/3 yrs)
- ₹8 Lakh threshold/3 yrs of salary calling income and other factors

SALARY EXCLUSION RULE (Excluded regular income)

- Included regular income for regular income, OBC
- Excluded regular income of regular layer benefit

THE CONFLICT: ADMINISTRATIVE DILEMMA vs. JUDICIAL FINDING



DoPT Calculation (including salaries)

- DoPT Calculation
- Creamy color
- Detaries including salaries

SC Ruling, (Rohith Nathan Case)

- Finding 'Hostile Discrimination' finding 'Hostile Discrimination', Supernumerary Posts
- Directing directing 'Supernumerary Posts'

LOGICAL & PHILOSOPHICAL FOUNDATIONS



Rawlsian Distributive Justice

Substantive Equality (Art. 16(4))

Creamy Layer Doctrine

Preventing Elite Capture

Doctrine of Non-Arbitrariness

UPSC RELEVANCE GRID

GS Papers 1-4
GS Papers 1-3
GS Papers 1-4

MULTIDIMENSIONAL ANALYSIS (UPSC RELEVANCE)



SOCIAL

Summary: Brief conceptuals and social medias



POLITICAL

Summary: Brief conceptuals of legal politics



LEGAL

Summary: Brief conceptuals or political practices



ETHICAL

Summary: Ethical conceptuals or economics



INTERNATIONAL

Summary: Brief conceptuals or economic



ECONOMIC

Summary: brief conceptuals on economy

THE WAY FORWARD: Administrative Reforms

1 - 2 - 3 - 4

1 FINALISE EQUIVALENCE (बैंचमार्किंग, PSUs)

2 ASSESSMENT FRAMEWORK (Private Sector)

3 INDEX CEILING (Inflation-Linked)

4 STRATEGIC IMPLEMENTATION (Cadre Stability)

How a star with an extreme magnetic field could prove space is not empty

The work could pave the way to show that the 'nothingness' of space is actually a complex and active medium, and help scientists refine their maps of the universe

Yusuf Ibrahim, Staff writer

In quantum physics, it has made numerous strange predictions, and scientists have checked and confirmed many of them. But one of the strangest ones remains unresolved. In the 1930s, the German physicist Werner Heisenberg and Hans Heinrich Euler proposed that empty space is not really empty. Instead, they predicted that in the presence of a magnetic field, the vacuum of space would behave like a crystal, changing the properties of light passing through it. The trouble with testing this prediction – called vacuum birefringence – is that the magnetic field has to be extraordinarily strong.

In a study published in *Nature* on August 5, astronomers from Australia, Canada, Japan, South Africa, Taiwan, and the U.S. reported it had observed such birefringence using two satellites and a telescope in Australia, almost confirming the prediction at long last.

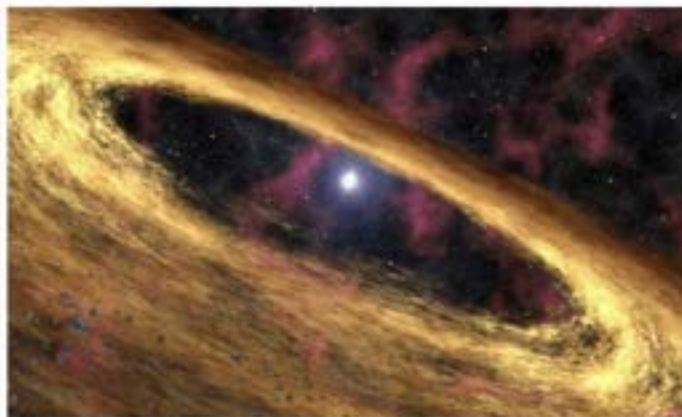
The work could prove 'nothingness' is actually a complex and active medium and also potentially help scientists refine their maps of the universe.

Staggering numbers

In classical physics, a vacuum is absolute nothingness, but in quantum electrodynamics (QED) – which is a theory in quantum physics – a vacuum is a soup of virtual particles, pairs of electrons and anti-electrons that constantly pop in and out of existence, and so quickly that they cannot be observed.

Normally, these virtual particles have a negligible effect on light. But when a magnetic field nearby becomes strong enough, it changes how the short-lived charged particles can move, so they respond differently to light depending on the direction in which its electric field is vibrating. This part of space will then behave like a calcite crystal when light passes through it, splitting it into different paths depending on its electric field, like an electromagnetic wave, light consists of electric and magnetic fields travelling through space.

For vacuum birefringence to become noticeable, the magnetic field has to be around 10 trillion times stronger than the earth's magnetic field, and more than 100 million times as strong as the ultra-powerful magnets in the world's largest science experiment, the CERN supercollider. These are staggering numbers far beyond the abilities of current technology, so physicists have been looking for proof of vacuum birefringence in outer space, where objects called magnetars generate the



An artist's impression of the magnetar 4U 0142+61. In May 2022, the XEP satellite had looked at vacuum birefringence around this dead star.

universe's most extreme magnetic fields. Sometimes the core of a dead star can collapse to form a neutron star. Neutron stars with powerful magnetic fields are called magnetars.

Radiating polarisation

The international team focused its attention on one magnetar named 4U 0142+61, located 16,700 light-years away. An independent expert, Gianluca Sobolewska-Laga and Jovian Wilson wrote in a commentary accompanying the team's paper, "4U 0142+61 belongs to a rare subset of magnetars that also emit pulses at radio wavelengths".

By combining X-ray and radio frequency measurements, then, the team could piece together the geometry of the magnetar's magnetic field.

If the vacuum of space were truly empty – as in classical physics – the X-rays from the magnetar would reach the earth with a low degree of polarisation. But the team found the opposite: the NASA Imaging X-ray Polarimetry Explorer (IXPE) satellite in particular detected very high levels of polarisation, up to 80% in some instances, which is the smoking gun of vacuum birefringence.

As X-rays leave the magnetar and move through the surrounding space, QED predicts that their electric field will have to lock itself into one of two directions – a condition that unpolarised space does not impose – thus polarising the light.

Since these directions are defined by the direction of the magnetic field, the X-ray polarisation is effectively calculated along the magnetic field lines. And as the X-rays travel away from the magnetar, their polarisation will stay fixed even as the magnetic field becomes less and less able to 'hold on'.

According to the team, the amount of polarisation dropped as the energy of the X-rays increased, which QED predicts as well. The team was also able to elucidate that the magnetar rotated along an axis that aligned almost perfectly with its magnetic poles, like a top spinning upright – a detail that informed the team's models of how the X-rays from the magnetar would look with and without vacuum birefringence.

The models that did not account for the phenomenon fit substantially worse with the telescope data than those that included it.

Direct observation

Other than IXPE, the team had also used the Neutron Star Interior Composition Explorer instrument onboard the International Space Station and the Hubble Space Telescope in Australia. The finding takes a big step towards bolstering space's character as a complex medium that both gravity and magnetism can manipulate.

On a final note, the team wrote in its paper that its next goal is "to more

directly probe the nature of the ... polarisation". And this, the commentary noted, requires "coordinated astronomical campaigns that observe multiple magnetars and cover a wider part of the electromagnetic spectrum". The current finding is indirect because the astronomers recorded polarised light and inferred from that that it had passed through extremely magnetised space.

Not yet proven

As Sobolewska-Laga and Wilson put it, the high polarisation reported in the study only proves vacuum birefringence if the team's model of the magnetar's geometry is correct. If, instead, its axis of rotation and magnetic poles are further apart, the X-rays could have been polarised by plasmas on the magnetar's surface.

A paper published in *The Astrophysical Journal* by researchers from Italy, Spain, and the U.S. has already raised doubts about the alignment.

Physicists are also interested in the vacuum resonance a distinctive dip in the polarisation – first one of the two allowed directions to the other – at a specific energy level. The international team itself reported a dip but said it was too noisy to be decisive.

But one way or another, the dark void between the stars is no where not with activity. realworld@photonix.co.uk

THE GIST

In the presence of strong magnetic fields, a phenomenon called vacuum birefringence can make the vacuum of space behave like a crystal and polarise light passing through it.

Using NASA's IXPE satellite, NICER instrument, and Australia's Hubble radio telescope, researchers observed highly polarised X-rays from magnetar 4U 0142+61, matching predictions made by quantum electrodynamics (QED).

The evidence depends on studies of the magnetar's geometry, and some scientists suggest the observed polarisation could instead be caused by plasma near the star; further observations of more magnetars are needed for direct confirmation.

- **Key Terms and Explanations**

- **Quantum Electrodynamics (QED):** The relativistic quantum field theory describing how light and matter interact. In classical electrodynamics, light waves pass through one another without interaction. In QED, photons can interact indirectly by momentarily fluctuating into virtual charged particles, demonstrating that electromagnetic fields interact with the quantum structure of space itself.
- **Quantum Vacuum and Virtual Particles:** In classical physics, a vacuum represents absolute void or empty space devoid of matter and energy. Quantum mechanics reveals that a vacuum is a dynamic, seething medium populated by "virtual particle-antiparticle pairs" (such as electrons and positrons) that spontaneously pop into existence and annihilate within fractions of a yoctosecond, governed by Heisenberg's Uncertainty Principle ($\Delta E \cdot \Delta t \geq \hbar/2$).
- **Vacuum Birefringence:** An optical phenomenon where empty space behaves like an anisotropic crystal (such as calcite) in the presence of an ultra-strong magnetic field. When electromagnetic radiation (like X-rays) traverses this magnetized vacuum, the virtual electron-positron pairs align along the magnetic field lines. This changes the refractive index of the vacuum for different polarizations, splitting the light into two perpendicular propagation modes with different phase velocities.
- **Magnetar:** An extreme subclass of isolated neutron stars—the collapsed, ultra-dense cores of massive stars—possessing the strongest magnetic fields known in the universe (10^{14} to 10^{15} Gauss, or roughly 88 trillion times stronger than Earth's magnetic field). Magnetars serve as unique natural cosmic laboratories for high-energy astrophysics, producing intense bursts of X-rays and gamma rays.
- **Polarization of Light:** The orientation of the oscillating electric field vector in an electromagnetic wave. While ordinary light is unpolarized (vibrating in all planes perpendicular to the direction of propagation), polarized light vibrates along specific geometric planes. Measuring the degree and angle of polarization in celestial radiation reveals the physical properties of the medium and magnetic fields through which the light traveled.
- **X-Ray Polarimetry and Observational Platforms:** Specialized astronomical instrumentation designed to measure the polarization angle and degree of high-energy X-ray photons emitted by cosmic sources. Space-based platforms like NASA's Imaging X-ray Polarimetry Explorer (IXPE), the Neutron Star Interior Composition Explorer (NICER) aboard the International Space Station, and ground-based radio observatories provide simultaneous multi-wavelength data to test quantum gravitational and electrodynamic predictions.

- **Main Arguments and Substantive Parts**

- **Empirical Demonstration of Non-Empty Vacuum:** The central thesis affirms that the physical vacuum is an active, structured quantum medium rather than an inert void. Strong magnetic fields can physically distort this medium, offering empirical proof for quantum field theories that predict vacuum fluctuations.
- **Verification of the 1930s Heisenberg-Euler Prediction:** German physicists Werner Heisenberg and Hans Heinrich Euler formulated the theoretical framework for non-linear electrodynamics in 1936, predicting that strong electromagnetic fields induce non-linear vacuum polarization. Because laboratory magnets (such as those at CERN's Large Hadron Collider) achieve only tens of Tesla, astronomical observations of magnetars provide the only viable testing ground.
- **High Degree of X-Ray Polarization as Empirical Evidence:** Observations of magnetar 1E 1547.0-5408 revealed linear X-ray polarization levels reaching up to 80%. When high-energy photons escape the magnetar's surface, their electric field vectors become strictly aligned along two orthogonal directions dictated by the external magnetic field lines. This provides strong indirect evidence of vacuum birefringence.
- **Exclusion of Classical Vacuum Models:** Theoretical models omitting QED vacuum birefringence fail to reproduce the high polarization signatures detected by polarimetric satellites. Incorporating quantum vacuum corrections yields a strong match between synthetic spectra and observed astrophysical data.
- **Alternative Explanations and Scientific Caveats:** Scientific rigor requires addressing alternative mechanisms. High polarization could theoretically arise from surface plasma layers or complex magnetospheric geometries if the star's rotational axis and magnetic dipole are misaligned. Confirming vacuum birefringence requires unambiguous detection of "vacuum resonance"—a characteristic energy-dependent dip in polarization where quantum and plasma effects cancel out.

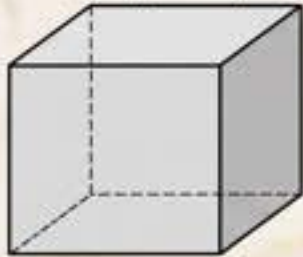
- **Historical Evolution of the Issue**
 - **Classical Conceptions of the Void (Late 19th Century):** Classical mechanics viewed the vacuum as empty space. Maxwellian electrodynamics postulated a luminiferous "ether" to carry light waves, an idea discarded following the Michelson-Morley experiment (1887) and Albert Einstein's Special Theory of Relativity (1905), which established the vacuum as empty spacetime with invariant light speed (c).
 - **Quantum Revolution and Relativistic Fields (1928–1936):** Paul Dirac formulated the relativistic wave equation in 1928, predicting antimatter and conceptualizing the vacuum as a "sea" of negative-energy electron states. In 1936, Werner Heisenberg and Hans Heinrich Euler derived the effective Lagrangian for quantum electrodynamics, mathematically demonstrating that electromagnetic fields in a vacuum can interact if external fields are strong enough to polarize virtual pairs.
 - **Consolidation of QED and Vacuum Phenomena (1940s–1950s):** Julian Schwinger, Richard Feynman, and Sin-Itiro Tomonaga finalized modern renormalized QED. Hendrik Casimir predicted the Casimir Effect in 1948 (experimentally confirmed decades later), proving that quantum vacuum fluctuations exert macroscopic physical forces between uncharged conducting plates.
 - **Theoretical Discovery of Magnetars (1990s):** Robert Duncan and Christopher Thompson proposed the magnetar model in 1992 to explain soft gamma repeaters and anomalous X-ray pulsars. They showed that rapid convective dynamo action in young neutron stars could generate magnetic fields exceeding 10^{14} Gauss, creating the conditions required to test QED vacuum birefringence.
 - **Modern Observational Astrophysics (2020s):** The launch of dedicated polarimetric space observatories—including NASA's IXPE (2021) and India's indigenous XPoSat (2024)—moved quantum vacuum studies from theoretical models into empirical observational science.
- **Way Forward**
 - **Expanding Multi-Messenger Astronomy:** Combine space-based X-ray polarimeters with gravitational wave detectors (LIGO, Virgo, KAGRA) and ground-based optical/radio telescopes to observe magnetar giant flares simultaneously across different wavelengths and cosmic messengers.
 - **Maximizing Indigenous Facilities (ISRO's XPoSat):** Leverage the POLIX (Polarimeter Instrument in X-rays) and XSPECT payloads on India's XPoSat to independently observe known magnetars, confirming degree of polarization and measuring high-energy spectral variations.
 - **Refining Stellar Atmosphere and Plasma Models:** Develop advanced magnetohydrodynamic (MHD) simulations to model the superheated plasma surrounding magnetars. Disentangling plasma-induced polarization from quantum vacuum birefringence is critical to verifying QED predictions.
 - **Establishing Open International Data Consortia:** Expand open-access computational pipelines and data repositories, enabling researchers from across the global South to analyze raw polarimetric data gathered by space agencies like NASA, ESA, and ISRO.
 - **Long-Term Investment in High-Energy Astroparticle Physics:** Support fundamental basic research in national universities and institutes (such as TIFR, IUCAA, and IIA), fostering domestic expertise in quantum field theory, optical design, and space instrumentation.



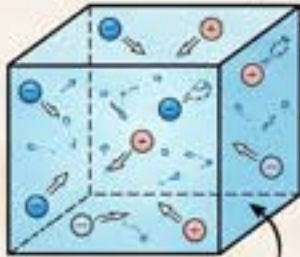
UPSC CSE SCIENCE & TECHNOLOGY SPECIAL: THE DYNAMIC QUANTUM VACUUM & MAGNETARS

QUANTUM VACUUM THEORY

Classical View
(Empty Void)



Quantum View
(Active Medium)



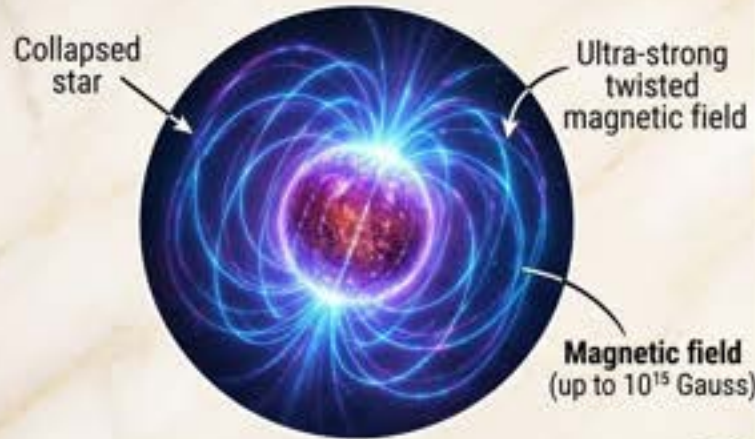
VS.

Heisenberg's Uncertainty Principle

- Quantum Electrodynamics (QED) and virtual particles
- A 'soup' of virtual pairs that constantly pop into and out of existence



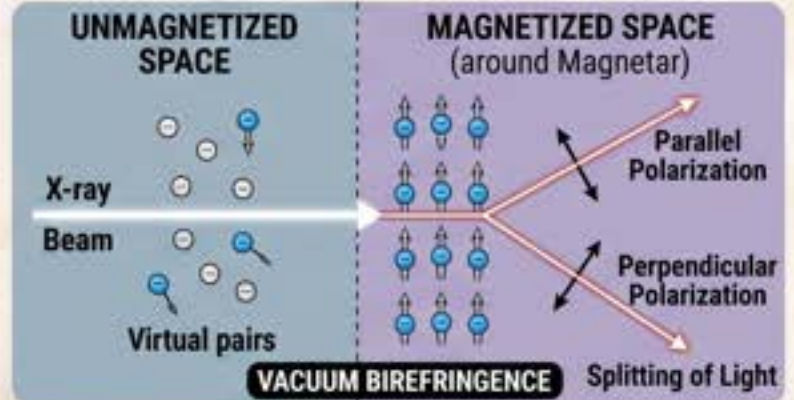
MAGNETARS: NATURE'S SUPER-MAGNETS



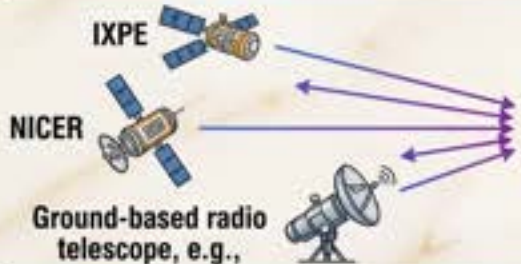
- Rare subclass of highly magnetized neutron stars
- Fields 88 trillion times stronger than Earth's



THE HEISENBERG-EULER PREDICTION: VACUUM BIREFRINGENCE



- Prediction (1930s): Space behaves like a crystal in strong magnetic fields
- Key to Mapping the invisible quantum cosmos



OBSERVED
~80% X-RAY
POLARIZATION

SIGNIFICANCE & KEY OBSERVATIONS

1. **SPACE IS NOT EMPTY:** Empirically proves the dynamic nature of quantum space.
2. **CONFIRMATION OF QED:** Confirms fundamental quantum field theory in extreme environments.
3. **NEW MAPS OF THE UNIVERSE:** Helps map and understand the universe with more precision.

Modi stresses need to keep India's youth free from drugs

Students, theatre groups must raise awareness against drug menace, says PM in his *Mann ki Baat* address; 35 lakh women across the country have benefited from PM SVANidhi Yojana, he adds

The Hindu Bureau
NEW DELHI

Prime Minister Narendra Modi has flagged the dangers of drug addiction, highlighted the economic avenues opening up for women and girls in India, including in the space industry, and lauded the cleanliness initiatives being undertaken by citizens.

"Drug addiction does not just engulf a single individual. The entire family and society have to bear the consequences," Mr. Modi said in his 137th *Mann ki Baat* episode on Sunday. "I would like to commend those who raise awareness against drugs and step forward to help individuals struggling with addiction."

Mr. Modi urged young musicians to produce songs that convey the message of a drug-free life, students and theatre groups to write short plays that highlight the dangers of drugs while also showing the path to recovery, and content creators to spread the message on social media in various languages.

"Let us all play our part in this noble mission to



keep India's youth away from drugs and free from addiction," Mr. Modi said.

Women empowerment

"From morning till evening, lakhs of women across the streets of our cities and towns are engaged in their work," the Prime Minister noted. "Some sell vegetables or fruits, others run tea stalls, while some sell flowers, earthen lamps, and worship materials."

He added that, often, a lack of capital prevents such businesses from growing further. "But now, lakhs of such mothers and sisters are gaining new strength through the PM SVANidhi Yojana," Mr. Modi said. "This aspect of wo-

men empowerment is not discussed as much as it should be. Women account for approximately 46% of the beneficiaries of the PM SVANidhi Yojana."

This, he explained, meant that around 35 lakh women across the country are expanding their businesses by connecting with this scheme. PM SVANidhi Yojana is a Central government scheme aimed at providing affordable and easy working capital loans without any guarantee to street vendors and hawkers in urban areas. "Today the flight of our daughters' dreams is soaring from the earth to outer space," Mr. Modi told listeners of his radio programme. "And

you will be proud to know that India is bringing together thousands of daughters who are nurturing such dreams, from across the globe. This initiative is named Mission ShaktiSAT."

Through this initiative, 12,000 girl students from 108 countries are getting the opportunity to learn satellite technology and to advance in the field of innovation, he said.

On August 23, celebrated as National Space Day, the second phase of Mission ShaktiSAT was launched at Gautam Buddha University in Greater Noida where around 100 female students from across the country, including remote regions, and various other countries came together.

"The goal of this entire initiative is truly special: preparations are under way to send a satellite - developed entirely through the participation of female students - into lunar orbit," Mr. Modi said. "I am confident that many of these students will carve out a distinct identity for themselves in the fields of science, technology, and innovation in the future."

- **Key Terms and Explanations**
 - **Substance Abuse and Psychotropic Substances:** The patterned use of psychoactive drugs, alcohol, or illicit substances that leads to significant clinical impairment or distress. Psychotropic substances alter brain function, affecting perception, mood, consciousness, and behavior, causing long-term physiological and psychological dependence.
 - **Golden Crescent and Golden Triangle:** Two major illicit opium-producing hubs flanking the Indian subcontinent. The **Golden Crescent** (spanning Iran, Afghanistan, and Pakistan) to the west and the **Golden Triangle** (spanning Myanmar, Laos, and Thailand) to the east make India a key transit corridor and consumer market for trans-border narco-trafficking.
 - **PM SVANidhi (PM Street Vendor's AtmaNirbhar Nidhi):** A Central Sector micro-credit scheme launched under the Ministry of Housing and Urban Affairs (MoHUA). It offers affordable, collateral-free working capital loans to urban street vendors, facilitating their transition into the formal banking system and building their digital credit history.
 - **Informal Urban Economy:** Economic activities, enterprises, and jobs that are neither registered with the state nor protected by formal labor regulations. Street vendors and hawkers form the backbone of this ecosystem, providing essential local supply chains despite facing chronic liquidity traps and lack of social security.
 - **STEM Gender Parity:** The equitable representation and participation of women in **Science, Technology, Engineering, and Mathematics**. Bridging the gender divide in these high-barrier technical fields enhances human capital and broadens technological innovation.
 - **Mission ShaktiSAT:** An initiative aimed at training thousands of female students globally in satellite technology and space sciences, providing them with hands-on exposure to payload design and orbital mechanics.
- **Main Arguments and Substantive Parts**
 - The long-term realization of a nation's demographic dividend depends on two interconnected priorities: shielding youth from structural socio-pathological threats like substance abuse, and expanding the productive capabilities of vulnerable and underrepresented groups through financial inclusion and technical education.
 - **Substance Abuse as a Collective Socio-Economic Threat:**
 - Addiction is not an isolated individual failure; it imposes heavy externalities on family stability, public healthcare budgets, and workplace productivity.
 - Combating this challenge requires moving beyond purely punitive approaches to include social and cultural interventions—leveraging performing arts, street theater, vernacular social media, and youth creators to normalize rehabilitation and break down social stigma.
 - **Bottom-Up Women's Economic Sovereignty:**
 - Urban street vendors operate in high-risk, low-margin informal environments where predatory informal credit drains daily profits.
 - Providing collateral-free, micro-working capital loans creates an institutional credit footprint. With women representing nearly half of these beneficiaries, financial access directly translates into improved household welfare, educational spending, and micro-enterprise growth.
 - **Democratizing High-Tech and Aerospace Capabilities:**
 - Economic empowerment must span both basic livelihoods and frontier technologies.
 - Expanding women's involvement in advanced scientific domains like space technology transforms them from passive beneficiaries into active leaders in deep-tech innovation.
 - **Balancing Grassroots Needs and Frontier Ambitions:**
 - A resilient national growth strategy balances informal welfare support (e.g., street vendor security) with forward-looking high-tech literacy (e.g., space-tech initiatives), building a diversified and inclusive talent base.

- **Historical Evolution of the Issue**

- **Pre-Independence Era:** The colonial administration treated opium and narcotics primarily as sources of state revenue through state-run monopolies, showing little concern for the social health of local populations. The urban informal sector remained completely unregulated, and women were largely excluded from institutional science and technical education.
- **Post-Independence to the 1980s:** The Indian Constitution framed public health as a primary duty of the state under **Article 47** (Directive Principles of State Policy). In response to international drug treaties, India enacted the **Narcotics Drugs and Psychotropic Substances (NDPS) Act, 1985**, shifting its legal posture toward strict criminal deterrence.
- **Economic Liberalization and Urbanization (1990s–2010s):** Rapid urban migration led to a surge in the informal urban workforce. At the same time, regional geopolitics turned India into a primary target for illicit synthetic narcotics and narco-terror funding. In response to long-standing advocacy, the **Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014** was enacted to legally protect informal hawkers.
- **The Modern Era (2015–Present):** Policy approaches shifted toward tech-enabled financial inclusion and community-led health programs. Interventions like the **Nasha Mukh Bharat Abhiyaan (NMBA)** prioritize community-based demand reduction. Meanwhile, schemes like **PM SVANidhi** leverage digital payment infrastructures (UPI) to extend formal micro-credit, and the liberalization of the space sector (via IN-SPACe) opens deep-tech avenues for young women.

- **Way Forward**

- **Four-Pillar Anti-Narcotics Strategy:**

- *Supply Reduction:* Use predictive analytics, satellite tracking, and inter-agency maritime patrols to interdict cross-border trafficking routes.
- *Demand Reduction:* Involve youth icons, local theater groups, and vernacular digital creators to deglamorize drug use and run peer-led support programs in educational institutions.
- *Harm Reduction & Healthcare:* Integrate de-addiction centers into primary healthcare networks under the National Health Mission, expanding access to opioid substitution therapies.
- *Reintegration:* Pair de-addiction programs with vocational training through the Skill India Mission to prevent post-treatment relapses.

- **Strengthening Informal Micro-Credit Systems:**

- *Credit Graduation:* Help street vendors build digital footprints that enable them to transition smoothly from basic micro-loans to formal MSME financing under the MUDRA scheme.
- *Social Safety Nets:* Bundle micro-credit accounts with affordable micro-insurance (such as PMJJBY and PMSBY) to protect street vendors from external financial shocks.
- *Urban Infrastructure Planning:* Require urban master plans to clearly demarcate vending zones, preventing arbitrary evictions and administrative harassment.

- **Expanding Opportunities for Women in STEM:**

- *Institutional Mentorship:* Build sustained mentorship pipelines that connect women in early-stage engineering with space incubators, ISRO projects, and private aerospace firms.
- *Dedicated Research Grants:* Provide targeted research fellowships for deep-tech, aerospace, and computing startups founded or led by women.

- **Encouraging Multi-Sectoral Convergence:**

- Link Urban Local Bodies, Self-Help Groups (SHGs), and youth volunteer networks (like the NYKS and NSS) into a unified delivery platform for urban welfare, public health, and digital literacy.



AXIA AS ACADEMY

RISE ABOVE THE REST

axiaiasacademy.com | +91 6002-417488

COMPREHENSIVE ANALYSIS: UNLOCKING INDIA'S DEMOGRAPHIC DIVIDEND.

KEY TERMS & DEFINITIONS.

① SUBSTANCE ABUSE & PSYCHOTROPIC SUBSTANCES



Patterned use of psychoactive drugs. Altered brain function and consciousness. Long-term dependence and distress.

② GOLDEN CRESCENT & GOLDEN TRIANGLE



India is a key transit corridor for trans-border narco-trafficking.

③ PM SVANidhi



Collateral-free micro-credit for urban vendors. Facilitating transition to formal banking.

④ INFORMAL URBAN ECONOMY



Economic activities not registered with the state. Lack of social security, chronic liquidity traps.

⑤ STEM GENDER PARITY



Equitable representation of women in Science, Technology, Engineering, and Math fields. Human capital development.

⑥ MISSION Shaktisat



Training female students in satellite tech. Providing hands-on exposure to payload design and orbital mechanics.

HISTORICAL EVOLUTION TIMELINE.

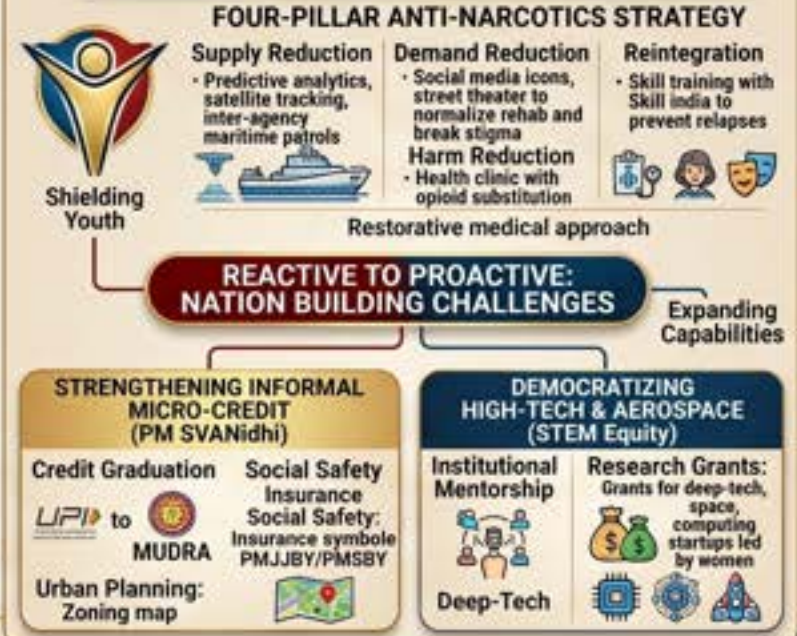


LINKAGES & ETHICAL BASES

SUB-GRID (Philosophical Bases)



INTEGRATED STRATEGY DIAGRAM.



SUB-GRID (UPSC & APSC Connections)



● THE BUS-SIZED TELESCOPE, NAMED AFTER LATE NANCY GRACE ROMAN, NASA'S FIRST CHIEF ASTRONOMER, WILL TAKE MORE THAN 3 MONTHS TO REACH ITS DESTINATION

'To find the rare & unusual': NASA launches new space telescope

Marcia Dunn

Cape Canaveral, August 30

NASA'S NEWEST crown jewel blasted off Sunday to hunt for planets around other stars, explore secret dark energy and survey the cosmos like never before.

SpaceX launched the \$4.3 billion Roman Space Telescope shortly after daybreak aboard a triple-the-fire-power Falcon Heavy rocket from Kennedy Space Center. Roman blazed toward an observation point 1.6 million kilometers away that's home to the Webb Space Telescope, one of NASA's other big-ticket eyes in the sky.

The bus-sized telescope — named after the late Nancy

Grace Roman, NASA's first chief astronomer — will take more than three months to reach its destination.

Once there, it will cast the widest gaze yet on the hidden parts of the universe from space, uncovering the unimaginable with unsurpassed speed.

"It's going to find thousands of supernovae, tens of thousands of planets, billions of galaxies and tens of billions of stars," said NASA science mission director Nicky Fox. "It's going to be able to do things that we've never been able to do before with its massive field of view."

Roman's field of view is more than 100 times wider than



A SpaceX Falcon Heavy rocket launches NASA's new Roman Space Telescope in Cape Canaveral, Florida, on Sunday. REUTERS

that of NASA's Hubble Space Telescope, still churning out celestial glamour shots after 36 years in orbit. Webb joined the

effort several years ago with an even narrower yet spot-on vision capable of zooming in on objects almost as old as the uni-

verse-creating Big Bang.

These three orbiting powerhouses will join forces — along with the European Space Agency's Euclid spacecraft and the National Science Foundation's Vera C Rubin Observatory in Chile — to reveal some of the universe's biggest secrets.

Inside the countless galaxies awaiting discovery are stars with planets. Once these new worlds are spotted by Roman, the more powerful and sensitive Webb will take aim to fill in the blanks.

"Roman's vast reach will allow us to find the weird, the rare and the unusual," senior project scientist Julie McEnery said on the eve of launch. "We'll redefine what it means to find a

needle in a haystack."

Perhaps even more important, astronomers expect Roman to shed light on the dark matter and dark energy that make up most of the universe yet remain concealed. Roman's catalog of galaxies will help scientists ascertain how quickly the universe is expanding due to these puzzling, unseen forces.

Roman's superpower is speed. A month of Milky Way observations by Roman would take Hubble a century to complete, according to McEnery. Roman should make quick work of scanning the galactic bulge at dead center, she added, providing the deepest look yet into the heart of our galaxy. AP

- **Key Terms and Explanations**
 - **Nancy Grace Roman Space Telescope (NGRST):** A state-of-the-art NASA observatory designed to unravel the mysteries of dark energy, hunt for exoplanets, and perform wide-field infrared astrophysics. Named after Dr. Nancy Grace Roman (NASA's first Chief of Astronomy, often revered as the "Mother of Hubble"), it features a 2.4-meter primary mirror equal in optical resolution to Hubble but equipped with a field of view 100 times larger.
 - **Lagrange Point 2 (Sun-Earth L2):** A gravitationally balanced orbital position located approximately 1.5 to 1.6 million kilometers directly behind Earth (as seen from the Sun). Positioning telescopes at L2 ensures a thermally stable, cold environment shielded from the direct glare and heat of the Sun, Earth, and Moon, permitting uninterrupted panoramic observations.
 - **Dark Energy and Dark Matter:**
 - *Dark Matter:* An invisible form of matter constituting roughly 27% of the universe's mass-energy budget. It does not absorb, reflect, or emit electromagnetic radiation and is detected exclusively through its gravitational pull on visible baryonic matter.
 - *Dark Energy:* A mysterious, repulsive force making up roughly 68% of the universe that drives the accelerating expansion of space-time, counteracting gravitational attraction at cosmological scales.
 - **Wide-Field Infrared Survey:** A panoramic imaging technique operating across near-infrared wavelengths. Because distant cosmic light shifts toward red and infrared spectra due to cosmic expansion (cosmological redshift), wide-field infrared detectors can photograph massive expanses of the sky rapidly, cataloging billions of faint, ancient galaxies in months rather than centuries.
 - **Gravitational Microlensing:** An observational phenomenon based on Einstein's General Theory of Relativity where the gravitational field of a foreground star (and any orbiting planet) acts as a natural lens, bending and magnifying the light from a background star. This allows the detection of small, distant exoplanets located far from their host stars.
 - **Coronagraphy:** An optical instrument integrated into a telescope that blocks the blinding, direct glare of a parent star, mimicking a solar eclipse. This allows astronomers to directly image faint, orbiting exoplanets and analyze their atmospheric chemistry.
- **Main Arguments and Substantive Parts**
 - **Paradigm Shift from Deep Targeting to Wide-Field Reconnaissance:** Traditional flagship space telescopes like the Hubble and James Webb Space Telescope (JWST) act as ultra-powerful "telephoto lenses" focusing on narrow patches of space. Wide-field observatories act as extreme "wide-angle panoramic cameras," capturing vast swaths of the cosmos simultaneously. A survey that would take Hubble nearly a century can be accomplished in a single month.
 - **Deciphering the "Dark Universe":** The telescope uses two complementary probes—Type Ia Supernovae distances and Weak Gravitational Lensing—to trace how large-scale cosmic structures have evolved over time. This provides empirical data to test whether dark energy is a static Cosmological Constant (Λ) or a dynamic, evolving scalar field (Quintessence).
 - **A Comprehensive Exoplanet Census:** By combining high-cadence gravitational microlensing with advanced coronagraphic technology, the mission bridges critical observational gaps. It can identify terrestrial planets in wide orbits (comparable to Earth, Mars, and Jupiter) and directly image gas giants, complementing the transit-focused observations of the Kepler and TESS missions.
 - **Triangulation and Synergy Across Global Observatories:** Rather than operating in isolation, modern space telescopes form an interdependent observation network. Wide-field surveys flag unusual, transient, or ancient objects across billions of light-years, allowing targeted deep-field observatories like JWST to perform detailed spectroscopic follow-ups.
 - **Integration with Commercial Heavy-Lift Platforms:** Utilizing commercial launch architectures (such as the SpaceX Falcon Heavy) highlights the growing integration between sovereign space agencies and private aerospace logistics, driving down payload-to-orbit costs for flagship scientific hardware.

- **Historical Evolution of Space Observatories**
 - **Pre-Space Age Theoretical Foundations (1920s–1940s):** Edwin Hubble discovered that galaxies are moving away from us, proving cosmic expansion (1929). In 1946, theoretical astrophysicist Lyman Spitzer proposed placing telescopes above Earth's atmosphere to eliminate atmospheric scintillation, light pollution, and infrared absorption.
 - **Early Orbital Pioneers (1960s–1980s):** The launch of the Orbiting Astronomical Observatory (OAO-2, 1968) and the Infrared Astronomical Satellite (IRAS, 1983) provided the first full-sky infrared surveys, proving that non-optical space astronomy is essential for seeing through interstellar dust clouds.
 - **The NASA Great Observatories Era (1990–2003):**
 - *Hubble Space Telescope (1990):* Revolutionized visible and ultraviolet deep-space imaging.
 - *Compton Gamma Ray Observatory (1991) & Chandra X-ray Observatory (1999):* Mapped high-energy, violent universe phenomena.
 - *Spitzer Space Telescope (2003):* Paved the way for cryogenic, deep-space infrared observations.
 - **Discovery of Accelerated Expansion (1998):** The High-Z Supernova Search Team and the Supernova Cosmology Project observed distant Type Ia supernovae and discovered that the expansion of the universe is accelerating, introducing the concept of Dark Energy and earning the 2011 Nobel Prize in Physics.
 - **The Targeted Infrared and Exoplanet Era (2009–2021):** NASA's Kepler and TESS missions cataloged thousands of transiting exoplanets, while the deployment of the James Webb Space Telescope (2021) to the Sun-Earth L2 point provided unprecedented infrared sensitivity to observe the earliest cosmic dawn.
 - **The Modern Big-Data Wide-Field Era (Present):** The launch of complementary survey missions—such as ESA's Euclid (2023), the ground-based Vera C. Rubin Observatory, and NASA's Roman Space Telescope—shifts astrophysics from targeted observation to high-cadence, big-data statistical mapping of the cosmos.
- **Way Forward**
 - **Building Coordinated Multi-Messenger Observation Networks:** Establish automated, real-time alert systems between wide-field space telescopes, ground-based optical/radio arrays, and gravitational wave observatories (like LIGO and VIRGO) to quickly follow up on transient events like supernovae and neutron star mergers.
 - **Deploying AI and Cloud Pipelines for Big Data:** With next-generation surveys producing petabytes of data, space agencies should invest in open-access cloud architectures equipped with automated machine learning and computer vision to rapidly identify anomalies, lenses, and exoplanet signatures.
 - **Accelerating India's Deep-Space Observational Roadmap:** Build on the success of AstroSat and Aditya-L1 by expanding ISRO's astronomy pipeline—prioritizing missions like AstroSat-2, participating in the Thirty Meter Telescope (TMT) project, and developing indigenous wide-field space survey instruments.
 - **Preserving Orbital Environments and Clear Skies:** Implement international guidelines under the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) to manage radio frequency allocations, reduce orbital space debris, and mitigate the impact of commercial satellite mega-constellations on ground- and space-based astronomy.
 - **Strengthening International Science Infrastructure in the Global South:** Facilitate technology transfers, research fellowships, and data-processing hubs in developing countries to help bridge the global scientific divide, turning deep-space discoveries into a shared resource for researchers worldwide.

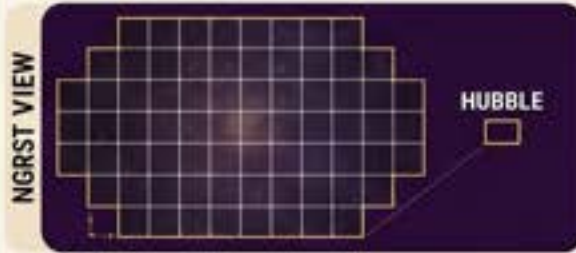


COMPREHENSIVE UPSC CSE ANALYSIS: NASA'S NANCY GRACE ROMAN SPACE TELESCOPE (NGRST) MISSION

THE NANCY GRACE ROMAN SPACE TELESCOPE (NGRST)

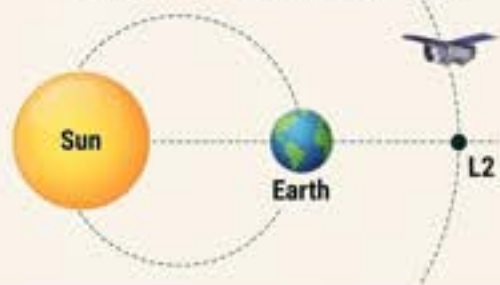


KEY FEATURES VS. HUBBLE (HST)



- Wide-Field Infrared Survey
- 2.4m Primary Mirror

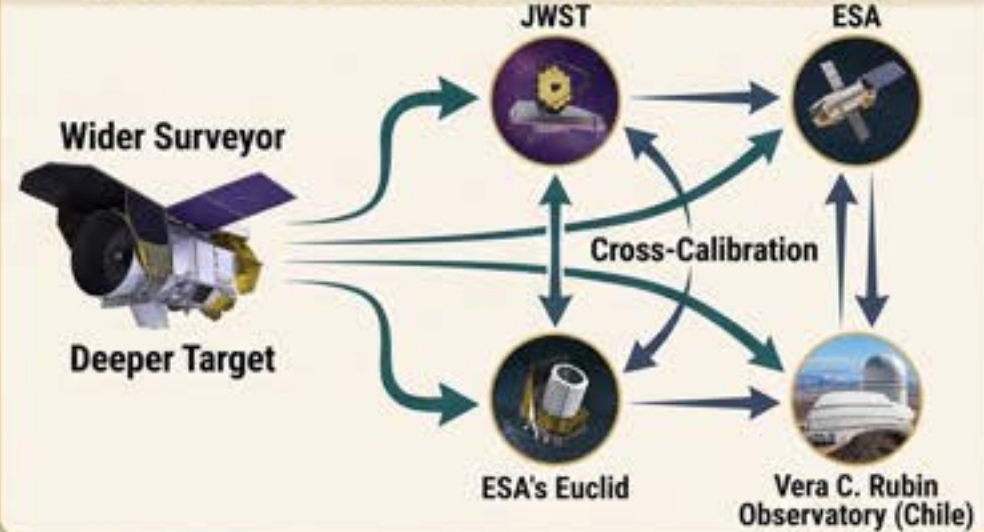
SUN-EARTH L2 POINT ORBIT



MULTIDIMENSIONAL ANALYSIS (UPSC GS RELEVANCE)

SOCIAL	POLITICAL	LEGAL	ETHICAL	INTERNAT -
• Democratization of science. • STEM representation • Agent sciences to harness & harness at science	• Technological preeminence, in other space allocation no swears in law. • Science commands to outpace infracts	• Outer Space Treaty compliance, health anomalies assistants • Hansen knowledge pooling, contest of spurs guillings and narrative	• Fundamental knowledge vs. resource allocation • Multi-agency data pooling and integration	• Multi-agency data pooling international. • Commercial launch launch synergy and spin-offs

GLOBAL OBSERVATORY SYNERGY NETWORK



NCERT & SYLLABUS LINKAGES

NCERT

Class 11/12

- Physics and Geography
- Infrared Topics
- Geography Topics
- Time and mapping topics

Geography

- Entero & Repressing & manorst
- Bridus on Din:Exposies
- Observation Topics

SYLLABUS MAPPING

GS Papers 1-4 with strong linkages:

- GS 3 Science & Tech awareness, achievement in space
- GS 1 Physical Universe Salient Features
- GS 2 Science Diplomacy
- GS 4 Public Expenditures & Resource Allocation

PREVIOUS YEARS' QUESTIONS (PYQ) THEMES & WAY FORWARD

RELEVANT UPSC/APSC PYQ THEMES

1. Multi-Funt firm Evaltnation of science
2. ESCT: Worinet Unnowall development
3. NGRST: Peterer Ovactions and fundations
4. ASS Devolomer in Astro Networks
5. APSC Science Bioment & Public Themes

STRATEGIC WAY FORWARD

- 1 Multi-Messenger Networks, and Multi-Messenger networks
- 2 AI Pipelines, to Impratal achievement in space
- 3 Indigenous Astro Roadmap, or Indigenous astro roadmap
- 4 Clear Skies, at avxosund to imporwant imigenous skies
- 5 Global South integration, and econnorant south integration

• ECONOMY

Worries behind India's robust GDP, inflation data

Six months after the war in West Asia broke out, the Indian economy appears to be holding up. But several risks to growth remain.



GRAPHS, DATA, PERSPECTIVES
BY UDIT MISHRA

OVER THE past three financial years, the Indian economy recorded a GDP (gross domestic product) growth rate of more than 7%, alongside a sharp drop in the inflation rate. Many analysts expected the US-Israeli War on Iran to dent this trajectory, owing to factors like an increase in the prices of crude oil and a reduction in foreign investments. Making matters worse was the prospect of high temperatures thanks to El Niño, which threatened to hit food production.

The growth rate was expected to fall, while the inflation rate was expected to skyrocket from 2% in 2025-26 to near 8% — from the lower end of RBI's "comfort zone" to its upper limit. On May 11, Prime Minister Narendra Modi even appealed to Indians to lighten their belts by stopping gold purchases and reducing fuel consumption, among other measures.

But macroeconomic data shows India hasn't fared as poorly as feared. On Monday, GDP data for Q1 will be released and is expected to yet again cross the 7% mark.

Resilient economy?

Six months since the war began, the GDP growth rate, inflation rate, and current account balance do not show the impairment initially feared.

A research note from HSBC states: "Growth remains high, inflation remains low, and the current account deficit surprisingly contained. Headline numbers across the board feel more goldilocks than crisis."

"Goldilocks" refers to a term analysts used at the start of the year to describe the economy, referring to an optimal state of affairs. The term, however, quickly lost favour once the West Asia war exposed persistent weaknesses in the Indian economy, best captured by the sharp fall in the rupee's exchange rate. As such, it makes sense to examine whether the economy has genuinely returned to a "goldilocks" scenario or if the data hides risks.

On GDP growth

In a detailed note, HSBC economists led by Pranshi Bhandari have explained both scenarios — why India's macros did not worsen as much as expected, and the

1. Services trade balance and remittances offsetting rising goods trade deficit



SOURCE: HSBC, HSBC

triggers that could make the picture worse.

HSBC's 100 indicators of growth data have points towards India's GDP growing by 7.5% during the first quarter (April, May and June). HSBC's research team has gone a step further, projecting an 8% growth.

What's driving that? Some of it can be ascribed to the 125 basis point cut in the repo rate between December 2024 and December 2025. The repo rate is the interest rate at which the RBI lends money to commercial banks. A lower repo rate makes it cheaper for banks to borrow money from the RBI and, in turn, cheaper for individuals and businesses to borrow from commercial banks. Cheaper loans incentivise economic activity, thus boosting growth. Often the "transmission" of a repo rate cut takes a couple of quarters to show up as faster GDP growth.

Another factor could be the effect of cuts in Goods and Services Tax in 2025. Lower tax rates reduced prices and improved people's purchasing power, resulting in higher economic activity. Yet another factor noted by HSBC economists is the rise of India's exports to the US as Donald Trump's tariffs were removed. Lastly, evidence suggests that manufacturers have loaded production as they were anxious about future energy availability.

On inflation, CAD

First, while the monthly retail inflation rate — the rate at which the general price level went up over the past — has moved up since October, it is still well contained and near the RBI's target level of 4% (see chart). Often, inflation remains muted be-

Heavy lifter

HSBC researchers argue that it is the services sector that is saving India the blueses as of now.

Accounting for 55% of India's GDP, the sector heavily affects where growth and inflation will land and how external deficits will be contained.

cause growth is muted. In this case, however, inflation has remained muted despite supply pressures, as well as demand holding up fairly well.

Secondly, the current account relies to the net amount of money flowing in or out of India as it trades exports and imports goods and services with the world. Typically, when the GDP is growing fast, or when imports are getting costlier, the country imports more than it exports, leading to a trade deficit. It translates into the outflow of billions of dollars.

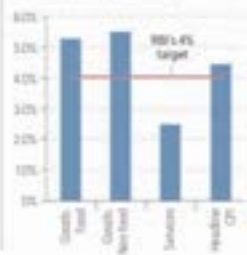
What India often earns from exports of services (like software services) as well as from remittances from Indians working abroad is not enough to make up for the dollar India shells out for imports, in general. The net result is called a current account deficit (CAD). But despite fast growth and costlier imports, India's CAD too has remained fairly muted. "The headline y/y deficit is low at 0.2% of GDP as per RBI's aggregated monthly data, and not showing signs of escalation," note HSBC economists (see chart).

Reading the numbers

While macro indicators look comparatively robust on the face of it, risks to growth and inflation persist.

On growth, HSBC research team state that a lot of the credit growth (increased loans) has been driven by factors such as "the new government credit guarantee scheme for small firms, the rise in working capital needs spurred by higher commodity prices, and the proliferation of gold loan growth (which can sometimes be seen as

2. Inflation contained



an indicator of stress). Moreover, the front-loading of manufacturing could be followed by a fall, and agricultural growth could weaken if the El Niño strengthens.

On inflation, the overall benign levels hide fairly divergent trends. HSBC research states that food inflation and non-food goods inflation are already averaging 5.8% (year-on-year) in July (see chart). What is holding back the headline inflation from rising is that services have remained "remarkably low at 2.9%". Therein lies the risk. "Low services inflation data is keeping headline (rate) contained. If it rises from here, reflecting growth better, headline inflation numbers could rise quickly," notes HSBC.

Similarly, on CAD, a closer look at the chart shows that it is low as of now because even though the goods trade deficit is growing, rising services exports and remittances are offsetting the rise in the trade deficit. HSBC states, "Given the uncertainties around the impact of AI on services exports growth, one needs to be careful on how long services can fend a rising goods deficit. Already, services exports have grown at a softer pace this year."

How expected India to survive this phase of global disruption without taking a hit? HSBC researchers argue that it is the services sector that is saving India the blueses as of now. Accounting for 55% of India's GDP, the sector plays a crucial role in determining where growth will land, how long inflation will remain low, and until when external deficits will be contained. If services inflation goes up and services exports take a hit, the RBI may be forced to raise interest rates, which could dampen growth.

- **Key Terms and Explanations**

- **Goldilocks Economy:** An optimal macroeconomic state where growth is robust enough to prevent recession, yet moderate enough to avoid overheating and runaway inflation. In such an environment, monetary policy operates smoothly without requiring drastic rate interventions.
 - **Monetary Policy Transmission:** The process through which central bank policy rate adjustments (such as the Repo Rate) translate into commercial bank lending and deposit rates, subsequently influencing consumption, investment, and aggregate demand across the real economy. This mechanism often exhibits a policy lag of two to four quarters.
 - **Current Account Deficit (CAD) and Invisibles:** The Current Account Deficit measures the shortfall when a nation's total imports of goods, services, and transfers exceed its total exports. While merchandise trade frequently runs a substantial deficit, the "invisibles balance"—comprising services exports (e.g., IT, professional consultancy) and inward remittances—acts as a vital counterweight to keep the overall CAD within manageable limits.
 - **Headline vs. Segmented Inflation (Goods vs. Services):** Headline Consumer Price Index (CPI) reflects the aggregate price change across a broad consumption basket. Segmented inflation disaggregates this measure into distinct components, such as food, non-food manufactured goods, and services. A subdued headline figure can sometimes mask underlying cost-push pressures in goods if services inflation remains temporarily suppressed.
 - **Front-Loading of Production:** The business practice where manufacturers accelerate output and build inventory ahead of regular schedules, driven by expectations of impending supply chain disruptions, energy shortages, or anticipated tariff shifts. While this inflates short-term industrial output figures, it carries the risk of a subsequent production lull.
 - **Distress Credit Indicators (Gold Loans):** A rapid surge in household borrowing against collateralized gold assets. While broad credit growth typically signals economic vitality, disproportionate expansion in personal gold loans often indicates underlying liquidity constraints, working capital distress among micro-enterprises, or stress within the unorganized sector.
-

- **Main Arguments and Substantive Analysis**

- **The Paradox of Headline Stability:** Macroeconomic aggregates—characterized by Gross Domestic Product (GDP) growth exceeding 7%, headline retail inflation hovering near the 4% target, and a modest Current Account Deficit around 0.3% of GDP—present an image of exceptional resilience. However, disaggregated data reveals structural vulnerabilities that diverge from the headline optimism.
- **Transient Growth Impulses vs. Structural Capacity:** The resilience in quarterly growth figures has been supported by a combination of lagged monetary easing (cumulative repo rate cuts), indirect tax rationalization boosting domestic purchasing power, and the front-loading of manufacturing activity driven by geopolitical and energy uncertainties. Because front-loading draws future production into the present, it raises questions about sustainability once accumulated inventories peak.
- **The Masking Effect in Inflation Dynamics:** Headline CPI stability obscures significant divergence between goods and services. While goods inflation (both food and non-food) experiences persistent upward momentum (averaging well above 5%), low services inflation (around 2.5%) temporarily anchors the aggregate basket. As economic activity expands, any upward normalization in services pricing risks driving headline inflation rapidly toward the upper tolerance band.
- **The Services Safety Net and Emerging External Headwinds:** A robust surplus in software and professional services, combined with resilient expatriate remittances, continues to absorb wide merchandise trade deficits triggered by elevated energy import costs. However, this buffer faces potential headwinds from the global integration of generative AI into enterprise services, alongside geopolitical volatility in key trade corridors like West Asia.
- **Credit Quality and Underlying Sectoral Stress:** Although aggregate bank credit growth appears strong, a granular assessment shows substantial expansion fueled by public credit guarantee schemes, elevated working capital requirements due to input commodity price inflation, and elevated retail borrowing via gold loans. These patterns suggest that cash-flow pressures persist across small enterprises and vulnerable households.

- **Historical Evolution of India's Macroeconomic Trajectory**
 - **Pre-1991 Era (Structural Deficits and External Vulnerability):** Characterized by an inward-looking import substitution regime, rigid administrative controls, and the "Hindu rate of growth" (averaging 3.5%). The structural imbalance between limited export capacity and rising import dependencies for crude oil and industrial capital culminated in recurrent Balance of Payments (BoP) crises, ultimately triggering the 1991 economic emergency.
 - **1991–2008 (Liberalization and Services-Led Expansion):** Structural adjustment programs introduced trade liberalization, exchange rate flexibility, and capital account opening. This period marked the emergence of India's export-oriented IT/ITeS sector. The structural trade deficit in merchandise was increasingly cushioned by invisible earnings, enabling high GDP growth (averaging 7–9%) with manageable external deficits until the 2008 Global Financial Crisis (GFC).
 - **2008–2014 (Post-GFC Fiscal Overheating and External Fragility):** Aggressive counter-cyclical fiscal spending and rapid credit expansion sustained growth immediately after the GFC but generated persistent double-digit CPI inflation and widening fiscal and current account deficits (Twin Deficit Problem). This culminated in the 2013 "Taper Tantrum," during which the Indian Rupee depreciated sharply, placing the country among the emerging market "Fragile Five."
 - **2014–Present (Institutional Reforms and Poly-Crisis Resilience):** Institutional anchors were introduced, notably the Flexible Inflation Targeting (FIT) framework under the amended RBI Act (2016), the Insolvency and Bankruptcy Code (IBC, 2016), and the unified Goods and Services Tax (GST, 2017). Despite subsequent supply shocks—including the COVID-19 pandemic, the Russia-Ukraine conflict, and West Asian geopolitical flare-ups—the economy demonstrated improved macro-prudential buffers, driven by strong foreign exchange reserves, public capex, and high-value service exports.
- **Way Forward**
 - **Enhance Supply-Side Agricultural Resilience:** Mitigate recurrent food inflation spikes by expanding climate-resilient agricultural infrastructure, upgrading cold-chain logistics, and leveraging precision satellite forecasting to insulate agricultural production from climatic anomalies like El Niño.
 - **Deepen High-Value Manufacturing Integration:** Accelerate the execution of Production Linked Incentive (PLI) schemes across high-technology and capital goods sectors to reduce import dependencies. Lowering domestic logistics costs toward global benchmarks will be critical to improving merchandise export competitiveness.
 - **Upgrade the Services Value Chain for the AI Era:** Support the transition of the IT and business process management sectors toward higher-value capabilities—such as specialized Global Capability Centres (GCCs), artificial intelligence integration, and cloud-native architectures—to preserve long-term services export growth.
 - **Calibrate Monetary-Fiscal Policy Coordination:** Maintain clear alignment between the RBI's inflation-targeting mandate and central/state fiscal policies. Targeted, counter-cyclical supply interventions should be prioritized over broad administrative restrictions, allowing monetary policy to support long-term investment without igniting price pressures.



Website: axiaiasacademy.com

Contact: +91 6002-417488

KEY TERMS & CONCEPTS. ?



GOLDILOCKS ECONOMY

A balance economy in balance economy



REPO RATE TRANSMISSION

A central bank fauces, money flowing.



CURRENT ACCOUNT DEFICIT & INVISIBLES

Trade scale with IT services in inonitities.



HEADLINE VS. SEGMENTED INFLATION

CPI chart with masks on with masks.



FRONT-LOADING PRODUCTION

A factory speed-up diagram a factory.



DISTRESS CREDIT (GOLD LOANS)

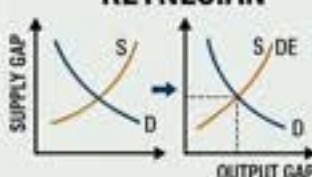
A pawn shop in a imaatration.

LOGICAL & PHILOSOPHICAL BASE.

KEYNESIAN

vs

SUPPLY-SIDE



STRUCTURAL DUALITY



LIMITS OF AGGREGATION



HISTORICAL EVOLUTION TIMELINE.

PRE-INDEPENDENCE TO PRESENT DAY



PRE-1991

Import Substitution, Controls, BoP Crises



1991-2008

LPG Reforms, IT Services Growth



2008-2014

Post-GFC Stimulus, High Inflation, Fragility



2014-PRESENT

Institutional Reforms (FIT, GST), Capex, Resilience

WAY FORWARD & REFORMS. ↑↑



ENHANCE AGRICULTURAL RESILIENCE



DEEPEN PLI INTEGRATION



UPGRADE SERVICES VALUE CHAIN FOR AI



POLICY COORDINATION (FISCAL & MONETARY)



STRENGTHEN MICRO-SURVEILLANCE OVER CREDIT



BOLSTER ENERGY DIVERSIFICATION

LINKAGES (NCERT, UPSC & APSC) & PYQs.

LINKAGES & RELEVANCE

NCERT: Class 12 Macro (Money, BoP), Class 11 Indian Economy (Reforms)

UPSC GS PAPERS: GS3 (Economy), GS2 (IR), GS1 (Society), Relevant Optionals (Economics, Public Admin)



PYQs (Prelims & Mains Themes):

- Inflation Targeting
- Repo Rate Transmission
- GDP Growth Rate Trends
- BoP Components

• DEFENCE

Why India took 16 years to acquire fire-and-forget Javelin missiles

Amrita Nayak Dutta

New Delhi, August 30

AFTER YEARS of deliberation, India finalised a deal last week to purchase the Javelin anti-tank guided missile (ATGM) system from the US through the latter's Foreign Military Sales (FMS) process.

The journey to procure the Javelin system, which began in 2010 and has now culminated after several paused attempts, highlights the lengthy and complicated nature of major defence acquisitions in India.

Initial interest

In August 2010, then Defence Minister A K Antony told Parliament that the government intended to procure third-generation Javelin ATGMs through the FMS route, which would also include a transfer of technology (TOT). The move was fuelled by a shortage of ATGMs in the Indian Army's inventory and a delay in the original timelines of indigenous ATGM systems developed by the Defence Research and Development Organisation.

The idea was to replace the ageing



Milan-2T and the Konkurs missile systems in use with the Army. Javelin was highlighted as the choice to immediately fill up the ATGM gaps, after the US forces actively showcased them during the 2009 bilateral exercise "Yudh Abhyas".

But the acquisition was eventually shelved owing to stringent technology transfer restrictions imposed by Washington. The US refused to share the missile's core seeker technology under a 100% TOT model,

causing India to pivot to Israel's Spike missile system — manufactured by Rafael Advanced Defense Systems Ltd — in 2014.

Deal for Spike

In 2014, India decided to go ahead with the Spike ATGMs as against the Javelin, after it was understood that it could offer greater flexibility of technology transfer and local production. The Defence Acquisition Council cleared the purchase of over 8,000 Spike ATGMs. But this also ran into long contract negotiations. Concerns over the Spike's performance in trials, technology transfer, and progress in India's man-portable ATGM programme led to a cancellation of the \$500 million order in 2017.

The deal was revived in 2018 following Israeli Prime Minister Benjamin Netanyahu's visit, but was subsequently shelved again. India, however, undertook an emergency purchase of a limited quantity of the fourth-generation Spike-LR ATGMs in 2019 to meet an immediate operational gap.

In August 2023, Kalyani Rafael Advanced Systems Pvt Ltd — a joint venture between Indian conglomerate Kalyani

Group and Rafael — said it had bagged a Rs 287.51 crore order from the Defence Ministry for the supply of the missile systems.

Back to Javelin

The Javelin reappeared in India-US strategic discussions at a time when defence cooperation between both countries had deepened. A US Congressional Research Service report, updated in 2025, noted that co-production discussions involving the Javelin were ongoing.

In February 2025, the Javelin Joint Venture — a partnership between US defence majors Lockheed Martin and Raytheon — said it was exploring co-assembly and co-production opportunities of the Javelin in India. It signed a memorandum of understanding with Bharat Dynamics Limited.

The discussion gained pace after Operation Sindoor in May last year. By July 2025, India was negotiating to get the Javelin systems, both as an emergency procurement and through a long-term contract — the latter likely involving co-production of the weapon systems. In November 2025, Washington officially cleared the sale.

The Javelin anti-tank guided missile system.

LOCKHEED MARTIN

- **Key Terms and Explanations**

- **Anti-Tank Guided Missile (ATGM):** A guided missile specifically designed to hit and destroy heavily armored military vehicles and tanks.
 - *First-Generation:* Required manual guidance by the operator via joysticks (e.g., Soviet *Malyutka*).
 - *Second-Generation:* Semi-Automatic Command to Line-of-Sight (SACLOS), where the operator keeps the sight crosshairs on the target while guidance commands travel via a trailing wire or radio link (e.g., *Milan-2T*, *Konkurs*).
 - *Third-Generation:* Autonomous "Fire-and-Forget" systems using onboard electro-optical imaging infrared (IIR) seekers that track the target independently post-launch (e.g., *Javelin*, *Nag*).
 - *Fourth/Fifth-Generation:* Incorporates networked data-links, loitering capability, and multi-sensor guidance to engage non-line-of-sight targets (e.g., *Spike-LR II*).
 - **Fire-and-Forget Capability:** An operational feature where a missile does not require continuous tracking, target illumination, or guidance from the operator after launch.
 - *Example:* Once a *Javelin* or *Spike* missile is locked onto a tank's thermal signature and launched, the operator can immediately displace or take cover, drastically reducing exposure to counter-fire.
 - **Top-Attack vs. Direct-Attack Profile:** A dual-flight capability where the missile climbs to an elevated altitude and strikes the top of a tank—where armor plating is thinnest—rather than penetrating the heavily reinforced front or side armor through direct flight.
 - **Foreign Military Sales (FMS):** A government-to-government (G2G) procurement process administered by the United States Department of Defense, allowing authorized foreign partners to purchase defence articles, services, and training directly from the US government rather than negotiating open commercial bids with private contractors.
 - **Transfer of Technology (ToT):** A contractual mechanism where the original manufacturer shares proprietary technical blueprints, manufacturing designs, source codes, and assembly capabilities with the buyer nation to foster domestic assembly, maintenance, and long-term absorption of the technology.
 - **Co-Production and Strategic Joint Ventures:** A model moving beyond transactional "buyer-seller" arrangements, where domestic manufacturing firms partner with foreign Original Equipment Manufacturers (OEMs) to fabricate, assemble, and test advanced systems domestically (e.g., Bharat Dynamics Limited collaborating with the Javelin Joint Venture, or Kalyani Rafael Advanced Systems).
 - **Critical Capability Gap / Operational Void:** A tactical deficit that emerges when frontline equipment becomes obsolete while the domestic replacement pipeline faces development or production delays, leaving troops vulnerable in active combat theaters.
-

- **Main Arguments and Substantive Parts**

- The long trajectory of modernizing infantry anti-armor capabilities illustrates the institutional friction between urgent tactical readiness and long-term self-reliance.

- **The Dilemma of Operational Readiness vs. Bureaucratic Cycles:**

- The frontline infantry of the Indian Army has long relied on vintage second-generation systems like the French *Milan-2T* and Soviet *Konkurs*.
- Because modern mechanized warfare requires rapid displacement and high survivability, the lack of widespread third-generation fire-and-forget systems creates a capability deficit along active frontiers such as the Line of Actual Control (LAC) and Line of Control (LoC).
- However, navigating capital acquisition cycles through the standard Defence Acquisition Procedure (DAP) often takes well over a decade.

- **The Technology Transfer Friction:**

- Early negotiations for advanced systems like the US *Javelin* stalled primarily due to stringent export controls and intellectual property restrictions.
- India sought comprehensive Transfer of Technology (including critical seeker and thermal imaging algorithms), which exporting nations were reluctant to surrender under a 100% ToT framework.
- This technological bottleneck prompted periodic pivots toward alternative systems, such as Israel's *Spike* family, which promised greater flexibility in local assembly.

- **The Balance Between Indigenous R&D and Foreign Procurements:**

- A central institutional debate persists regarding whether large-scale foreign procurements undermine the development of indigenous platforms, such as the Defence Research and Development Organisation's (DRDO) Man-Portable Anti-Tank Guided Missile (MPATGM) and the *Nag/Helina* systems.
- Procurement decisions often vacillate: deals are cancelled or downsized to protect domestic R&D, only for limited emergency off-the-shelf procurements to be sanctioned when border tensions escalate.

- **The Evolution from Pure Import to Co-Production:**

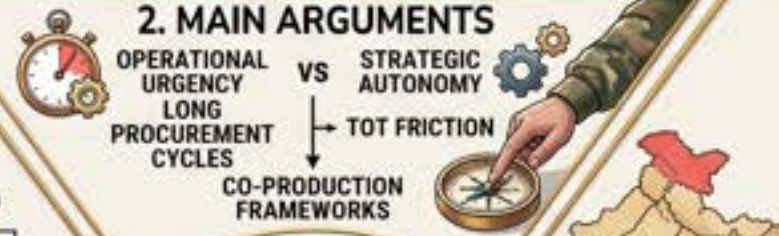
- The trajectory highlights an evolution in India's defence procurement philosophy: shifting away from pure direct off-the-shelf imports toward joint development, licensed domestic assembly, and deep co-production involving both Defence Public Sector Undertakings (DPSUs) and the domestic private sector.

- **Historical Evolution of the Issue**
- **Early Post-Independence and the Mechanized Realization (1960s–1970s):**
 - During the 1965 and 1971 conflicts with Pakistan, the decisive role of armor in the plains of Punjab and the deserts of Rajasthan demonstrated the urgent need for dedicated, dismounted anti-tank units.
 - Early doctrines relied on recoilless rifles, anti-tank guns, and early first-generation wire-guided missiles.
- **The Era of Second-Generation Induction and IGMDP (1980s–1990s):**
 - In the 1980s, India established licensed manufacturing lines through Bharat Dynamics Limited (BDL) for French *Milan* and Soviet *Konkurs* systems.
 - Simultaneously, the landmark Integrated Guided Missile Development Programme (IGMDP) was initiated in 1983 under Dr. A.P.J. Abdul Kalam, identifying the *Nag* missile as India's indigenous third-generation anti-tank solution.
- **Post-Kargil Modernization and High-Altitude Realities (2000s):**
 - The 1999 Kargil conflict reinforced the imperative for lightweight, man-portable, high-precision munitions capable of operating at extreme altitudes.
 - During bilateral military engagements such as *Exercise Yudh Abhyas* in 2009, modern third-generation systems like the US *Javelin* demonstrated operational utility, prompting India's Ministry of Defence to formally pursue acquisition through the FMS route in 2010.
- **The Decade of Strategic Re-evaluations (2010–2019):**
 - Between 2010 and 2013, negotiations with the US hit roadblocks regarding high platform costs and stringent technology transfer policies.
 - In 2014, India pivoted toward Israel's *Spike* system, which offered local assembly partnerships. However, this procurement was repeatedly stalled, renegotiated, and eventually cancelled in 2017 to provide dedicated development space for the DRDO's indigenous MPATGM.
 - Following heightened operational demands along the Northern borders in 2019, limited quantities of *Spike-LR* were inducted under emergency fast-track procurement powers.
- **The Modern Era of Strategic Partnerships and Co-Production (2020s–Present):**
 - The standoff along the Eastern Ladakh sector in 2020 reiterated the necessity of versatile, high-altitude anti-armor systems across extended frontages.
 - Bolstered by broader strategic mechanisms such as the India-US initiative on Critical and Emerging Technologies (iCET) and foundational defence pacts, long-stalled procurement channels evolved into formal agreements for co-assembly and co-production involving domestic industrial bases.
- Way Forward
- **Institutional and Procedural Streamlining in Procurement:**
 - *Time-Bound Fast-Track Mechanisms:* Standard capital procurement under the Defence Acquisition Procedure (DAP) must be restructured to prevent 10- to 15-year gestation cycles. Implementing strict, milestone-driven evaluation phases can prevent bureaucratic deadlocks.
 - *Empowered Project Management Teams:* Assign dedicated, inter-disciplinary teams comprising military end-users, procurement specialists, and technical experts to oversee strategic procurements from inception to field induction without administrative turnover disruptions.
- **Transitioning from "Buyer-Seller" to Co-Development Ecosystems:**
 - *True Technology Co-Development:* Avoid simple semi-knocked-down (SKD) or completely knocked-down (CKD) assembly lines. Contracts with global partners must focus on sharing core intellectual property, including focal plane array seekers, propulsion chemistry, and onboard guidance software.
 - *Deepening Private Sector Integration:* Leverage the Strategic Partnership (SP) model and schemes like Innovations for Defence Excellence (iDEX) to integrate private Indian aerospace and precision-engineering firms into global defence supply chains.

1. KEY TERMS & EXPLANATIONS



UPSC COMPREHENSIVE DEFENCE ACQUISITION ANALYSIS HUB: (Javelin/Spike and Beyond)



3. HISTORICAL EVOLUTION (TIMELINE)



4. LOGICAL FOUNDATIONS



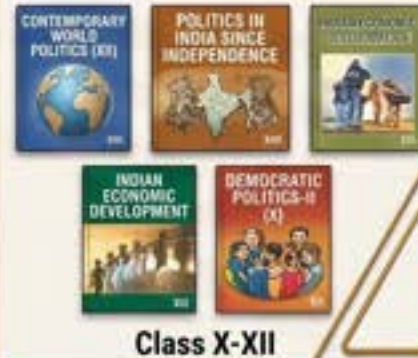
5. MULTORICAL FOENENCE



5. MULTIDIMENSIONAL ANALYSIS



6. NCERT LINKAGES



7. UPSC CSE SYLLABUS LINKAGES



8. WAY FORWARD



9. PREVIOUS YEARS QUESTIONS (PYQs)



AXIA IAS ACADEMY

RISE ABOVE THE REST

axiaiasacademy.com | Contact: +91 6002-417488

• GLOBAL

Can Trump rename Lake Ontario as Lake America?

Rishika Singh
New Delhi, August 30

US PRESIDENT Donald Trump last week signed an executive order to rename Lake Ontario, situated on the US-Canada border, as "Lake America". The order said the lake was a "tremendous asset to the United States and part of our Nation's heritage".

In response, Canadian Prime Minister Mark Carney wrote in a post on X that the name Ontario (also the name of a Canadian province) comes from the indigenous Wendat people. "The name is more than 400 years old, predating both the Confederation of Canada and the Declaration of Independence of the United States of America... reality means calling it Lake Ontario - then, now and always," he wrote.

Why the move

Lake Ontario is part of the Great Lakes system, along with Lake Superior, Michigan, Huron and Erie, spanning the US-Canada border. According to the US National Ocean and Atmospheric Administration (NOAA), the lakes system holds about 90% of the freshwater in the US and approximately 20% of the world's freshwater supply. Forty million people across the two countries depend on it for clean drinking water.



• GREAT LAKES

• Lake Ontario is part of the Great Lakes system, along with Lake Superior, Michigan, Huron and Erie, spanning the US-Canada border.

• Forty million people across the two countries depend on it for clean drinking water.

In his executive order, Trump cited a range of reasons for the decision — including the US's investments in the lake to keep it open for free shipping, Canada spending comparatively less on it, and the lake's history as an "asset to American exploration, settlement, commerce, and defense."

But more pressingly, it comes amid heightened trade tensions between the countries. Trade talks collapsed last week and led to the US imposing tariffs on Canada, with Carney promising to match them "dollar for dollar" against American imports. The US is Canada's largest trading partner, while Canada is the US's second-largest trading partner.

What changes

The name change will apply to how the US officially refers to the lake, but will not affect what Canada or the rest of the world call it. No single global organisation is tasked with ensuring uniformity among names of water bodies, and the decision to use a certain name is often based on historical precedent.

In a social media post, Trump stated that the US Geological Survey was officially changing the name to have it reflect in all official USGS electronic documents.

This is not the first time that disagreements over trade and other issues have prompted Trump to use nomenclature as a tool.

In January 2025, Trump renamed the Gulf of Mexico as the Gulf of America, amid tensions with Mexico over immigration and tariffs. It took about two weeks for the US government to update the official federal nomenclature to reflect those changes. The change was also reflected on Google Maps. Google Maps is now reflecting the changed name for Lake Ontario too.

How Google Maps names disputed features

According to Google, the names seen on Maps are based on information such as a user's country location and phone operating system (e.g., iOS and Android). In 2025, users in Mexico saw "Gulf of Mexico" on Maps while those in the US saw "Gulf of America".

For other users, both names are visible. For example, in the present case, users in India can see "Lake Ontario (Lake America)".

- **Key Terms and Conceptual Explanations**

- **Toponymic Geopolitics and Cartographic Sovereignty:** The strategic mobilization of geographical naming and cartography by state actors to project territorial legitimacy, assert political hegemony, or revise historical narratives over shared or disputed features. Place-naming (*toponymy*) serves as a non-kinetic instrument of statecraft (e.g., historical disputes over the "Sea of Japan" vs. "East Sea" or the "Persian Gulf" vs. "Arabian Gulf").
- **Transboundary Water Commons:** Shared hydrological systems—such as river basins, aquifers, and lake networks—that straddle international boundaries. Their governance requires bilateral or multilateral treaties to balance sovereign rights with common stewardship, preventing unilateral overreach (e.g., the Indus Waters Treaty or the US-Canada Boundary Waters Treaty).
- **Laurentian Great Lakes Hydrosystem:** A series of five interconnected freshwater lakes (Superior, Michigan, Huron, Erie, and Ontario) that together form the largest group of freshwater lakes on Earth by total area. They hold roughly 20% of the world's surface freshwater and 90% of North America's supply, serving as a critical commercial shipping channel via the St. Lawrence Seaway.
- **Indigenous Toponymy and Cultural Patrimony:** Geographic naming derived from First Nations and indigenous linguistic traditions (such as the Wendat/Huron origin of *Ontario*, translating to "sparkling water" or "great lake"). These names signify pre-colonial cultural identity, historical prior occupancy, and intangible heritage that predates modern Westphalian state boundaries.
- **Algorithmic Cartographic Pluralism:** The commercial and geopolitical practice adopted by global digital mapping platforms (such as Google Maps or Apple Maps) where digital cartography is dynamically altered based on the user's IP address, jurisdiction, or regional legal mandates, displaying divergent boundaries and toponyms to suit local political sensitivities.

- **Core Arguments and Substantive Themes**

- **Unilateral Executive Overreach vs. Bilateral Norms:** A sovereign state can alter geographic nomenclature within its domestic administrative registries (such as national geological databases). However, unilateral executive decrees cannot alter international cartographic consensus or force another sovereign state sharing that transboundary water body to accept the revision.
- **Geographical Nomenclature as a Geopolitical Bargaining Tool:** Nomenclature disputes often act as diplomatic pressure points during broader economic and trade negotiations. Tariff disputes, immigration standoffs, and disagreements over maritime infrastructure costs can lead states to use symbolic cartographic revisions to signal dissatisfaction and project domestic strength.
- **Asymmetrical Financial Stewardship vs. Historical Rights:** Claims that a state shoulders a larger share of maritime dredging, shipping lane safety, and environmental protection can be used to justify renaming assets. However, historical use, bilateral co-management, and native heritage present counterarguments against exclusive national branding.
- **Absence of a Supra-National Naming Arbiter:** The international system lacks a single global body empowered to impose uniform geographic names on shared international waters. Standardized global practice relies on bilateral consensus, customary international law, and voluntary bodies like the United Nations Group of Experts on Geographical Names (UNGEGN).
- **Indigenous Erasure and Cultural Contestation:** Replacing ancestral indigenous names with modern nationalistic titles erases pre-colonial histories. It directly conflicts with international norms recognizing indigenous rights, asserting a modern nationalist identity over centuries of shared stewardship.

- **Historical Evolution of Transboundary Nomenclature and Governance**
 - **Pre-Colonial Era (Pre-16th Century):** The Great Lakes basin was inhabited and managed by Indigenous confederacies, including the Wendat (Huron), Haudenosaunee (Iroquois), and Anishinaabe. Toponyms reflected local ecological landmarks, hydrological characteristics, and native spiritual connections.
 - **Colonial Partition (1783–1814):** The 1783 Treaty of Paris established the preliminary boundary between the newly independent United States and British North America through the middle of the Great Lakes. The War of 1812 and the subsequent Treaty of Ghent (1814) solidified these water boundaries, recognizing them as shared transboundary passages rather than exclusive national territories.
 - **Institutionalization of Joint Stewardship (1909):** The landmark **Boundary Waters Treaty of 1909** established the **International Joint Commission (IJC)**. This treaty pioneered international environmental law by mandating that shared waters could not be polluted or unilaterally diverted to the detriment of the other nation, establishing equal rights in navigation.
 - **The St. Lawrence Seaway Integration (1954–1959):** Joint engineering initiatives turned the Great Lakes-St. Lawrence system into a shared deep-draft navigation route, solidifying economic interdependence and binding both nations to joint governance over water levels, commercial shipping, and environmental conservation.
 - **Contemporary Era of Cartographic Friction:** The 21st century has seen the rise of domestic executive unilateralism and populist nationalism, where geographic names (e.g., the Gulf of Mexico, Lake Ontario) are tied to bilateral trade disputes, testing historical diplomatic norms and institutional frameworks.
- **Way Forward**
- **Reinforce Bilateral Transboundary Institutions:**
 - Both nations should address transboundary water and navigation concerns through established bilateral bodies, such as the International Joint Commission (IJC). Unilateral actions should be replaced with structured dialogue under the Boundary Waters Treaty framework.
- **Adhere to UNGEGN Cartographic Guidelines:**
 - States should follow the conventions established by the **United Nations Group of Experts on Geographical Names (UNGEGN)**. These guidelines promote consensus, respect historical and indigenous heritage, and reduce cartographic confusion in international navigation.
- **Separate Symbolic Disputes from Trade Negotiations:**
 - Diplomatic channels should separate cultural, historical, and geographical nomenclature from economic negotiations. Addressing trade imbalances and tariff disputes directly prevents symbolic issues from complicating commercial relations.
- **Recognize and Protect Indigenous Toponymy:**
 - Domestic and international mapping agencies should adopt dual-naming conventions that respect native heritage. Integrating indigenous titles (e.g., Wendat, Anishinaabe) into official cartography helps preserve cultural memory alongside modern administrative designations.
- **Establish Ethical Standards for Digital Cartography:**
 - Tech platforms managing global digital maps should develop clear, neutral standards for disputed or shared geographic features. Labeling should reflect dual names or reference international treaties rather than shifting names based solely on localized domestic decrees.

A COMPREHENSIVE ANALYSIS OF TRANSBOUNDARY WATER GEOPOLITICS & GEOGRAPHIC RENAMING DISPUTES

UNILATERAL EXECUTIVE ACTION & NOMENCLATURE AS A TOOL

- Leverage in Trade Standoffs
- Political Soft Power
- Domestic Re-Mapping
- Lack of Suprapolitical Arbiter



UNDERSTANDING THE CORE TENSION: UNILATERALISM VS. COOPERATION OVER SHARED COMMONS

KEY TERMS & PHILOSOPHICAL BASE

- Toponymic Geopolitics
- Transboundary Water Commons
- Indigenous Toponymy
- Common-Pool Resource Theory (Ostrom)

MULTIDIMENSIONAL IMPACTS & RISKS

- | | |
|---|---|
| SOCIAL:
<ul style="list-style-type: none"> • Indigenous Erasure (e.g., Wendat heritage) • Cultural Strains | POLITICAL:
<ul style="list-style-type: none"> • Weak Bilateral Ties • Unilateral Precedents |
| LEGAL:
<ul style="list-style-type: none"> • Exclusive to Domestic Domain, Limits of IJC Mandate | ETHICAL:
<ul style="list-style-type: none"> • Stewardship Duty • Native Rights Overwrite |
| INTERNATIONAL:
<ul style="list-style-type: none"> • Algorithmic Cartographic Pluralism • Fragmentation of Navigation Charts | ECONOMIC:
<ul style="list-style-type: none"> • Navigation Cost-Sharing • Trade Spillover |

ESSENTIAL UPSC & NCERT LINKAGES



NCERTs:

- Class 11-12 Geography (Drainage, Resources)
- Class 11-12 Pol Sci (Rights, Commons)



GS Papers (Prioritized):

- GS 2 (IR, Governance)
- GS 1 (Geography, Society)



- GS 3 (Economy, Environment)
- GS 4 (Ethics)

WAY FORWARD: STRATEGIC SOLUTIONS



Native
Symbols



- STRENGTHEN IJC & BILATERAL INSTITUTIONS
- ADHERE TO UNGEGN CARTOGRAPHIC STANDARDS
- DECOUPLE SYMBOLIC & ECONOMIC DISPUTES
- RECOGNIZE INDIGENOUS TOPONYMY (Dual Naming)
- DEVELOP ETHICAL MAP ALGORITHMS



AXIA
IAS ACADEMY

axiaiasacademy.com
+91 6002-417488

The many hurdles ChatGPT for Teens safeguards could run into for Indian users

Anagha Jayakumar
New Delhi, August 30

OPENAI RECENTLY announced the launch of a version of ChatGPT exclusively for teenage users.

Teenagers are already using ChatGPT extensively, with OpenAI saying nearly nine in 10 teens turn to it for learning, information, skill-building or productivity in a week. But their growing use of AI tools has also spurred concerns over how these systems respond to young users, particularly when conversations move beyond homework or information-seeking into emotional support, mental health and companionship.

Crucially, the new offering is not a separate application or website. Teenagers continue to use the regular ChatGPT, but with additional, age-appropriate features built in. These are automatically enabled when a user's stated or verified age, or OpenAI's age-prediction system, indicates that they are under 18. OpenAI does not allow children below age 13 to use ChatGPT.

Establishing user age

According to OpenAI, it uses information associated with an account, including a user's stated or verified age, as well as an age-prediction system that looks at signals such as how long the account has existed, the times of day it is typically used, general conversation topics, and patterns of use.

In India, the relationship between a device, an account and the person using it is not always straightforward. The RATI Foundation's Ideal Internet 3.0 study, released in November 2025, found that 62% of Indian teenagers surveyed used shared devices. Moreover, 42% reported that other people operated their social media accounts, while 56% said they could log into someone else's.

The 62% figure was acknowledged in OpenAI's Teen Safety Blueprint for India, released this January. While this does not directly imply that teenagers are using shared ChatGPT accounts, it raises questions for a system attempting to determine the age of the person behind an account.

Pragya Misra, Head of Strategy & Global

Affairs, OpenAI India, told *The Indian Express* that ChatGPT for Teens is designed around the account rather than the device. This means that if a teenager and an adult use separate accounts on the same shared device, each can receive the experience appropriate to their age.

"It is not intended to distinguish between multiple people using the same shared account or to switch experiences person by person within one login," Misra said of the age-prediction system. When uncertain about a user's age, OpenAI defaults to the under-18 experience.

Potential pitfalls

A risk assessment undertaken by Common Sense Media, an independent media watchdog for content consumed by children, and Stanford Medicine's Brainstorm Lab for Mental Health Innovation found that leading AI chatbots failed to recognise and appropri-

ately respond to mental health conditions affecting young people.

Robbie Torney, Head of AI and Digital Assessments at Common Sense, told *The Indian Express* that meaningful testing of safeguards requires "testing the product that teens are using, not a model in isolation over an API". Traditional benchmarks, he pointed out, are often based on collections of single-turn conversations, which do not necessarily capture how teenagers interact with these products.

The assessment found that chatbots frequently missed warning signs of mental-health distress, including when users disclosed them indirectly.

The researchers also found a marked difference between isolated prompts and longer interactions: while safeguards performed better when presented with explicit, single-turn prompts, they became

less reliable over extended conversations that more closely resembled how young people might actually use a chatbot.

The Common Sense-Stanford assessment also warned that the features that make chatbots engaging, including empathetic responses, follow-up questions and memory, could encourage young users to rely on them for emotional support when human intervention may be necessary.

Asked whether OpenAI had tested the teen experience over sustained interactions, Misra said ChatGPT for Teens was supported by "ongoing safety research, red-teaming, evaluations, and adversarial testing", including teen-specific evaluations covering self-harm, eating disorders, violence, age-restricted goods and services, and sexual content.

"The experience also includes proportionate break prompts during unusually long, active sessions, along with safeguards designed to reinforce real-world support and reduce emotional dependence," she said.

Different user needs

OpenAI has acknowledged that safety features designed for Indian teenagers may run into a unique set of challenges. The Teen Safety Blueprint for India notes that Indian teenagers often access technology in "shared, multilingual and mediated contexts", rather than through the single-user, private devices many safety tools assume.

The RATI report notes that this divide is amplified in rural and low-income contexts. Only half of the teenagers surveyed had a personal email ID, compared with 28% among rural low-income teenagers.

This divide matters because how some of the additional safeguards work. Parents can link their ChatGPT account to their teenager's through an email invitation, after which they can set quiet hours, manage certain settings and receive safety notifications. This could put teenagers in lower-access households at a disadvantage in using these parental controls.

LONGER VERSION

INDIANEXPRESS.COM/EXPLAINED



A weekly column
decoding AI's new
frontiers, how they
shape the world and
our place in it

- **Key Terms and Conceptual Frameworks**
 - **Heuristic Age-Prediction Systems:** Algorithmic mechanisms that infer a user's age based on behavioral telemetry, temporal usage patterns, linguistic complexity, and topical prompts rather than static, verified identity credentials. *Example:* A system tagging an account as "under-18" because interactions peak during after-school hours and focus on homework topics.
 - **Multi-Turn Conversational Vulnerability:** The tendency of conversational AI safety guardrails to degrade over prolonged, back-and-forth interactions. While a single explicit prompt triggers immediate ethical filters, extended multi-turn dialogue can bypass safety guardrails through subtle emotional context drift.
 - **Anthropomorphic Parasocial Bonding:** The psychological phenomenon where human users—particularly vulnerable adolescents—attribute authentic consciousness, empathy, and emotional reciprocal care to large language models (LLMs), leading to emotional dependency.
 - **Mediated and Shared Device Ecosystems:** A socio-technical reality prevalent in the Global South where a single hardware terminal (e.g., family smartphone) is shared among multiple family members, disrupting the Western technical assumption of "one user, one account, one device."
 - **Parental Dashboard Asymmetry:** A governance model that relies on advanced digital capital (such as independent email identity and separate parental accounts) to enforce safety, inadvertently excluding low-income or digitally marginalized households.
 - **Adversarial Red-Teaming for Adolescents:** The rigorous stress-testing of AI architectures using simulated scenarios to identify edge-case vulnerabilities, specifically involving self-harm, eating disorders, substance abuse, and predatory exploitation.
- **Core Thematic Dynamics and Systemic Challenges**
 - The deployment of generative AI tailored for adolescent cohorts reveals structural friction between global technological design and local socio-economic realities:
 - **The Fallacy of Individual Hardware Ownership:** Global safety architectures assume that user profiles correlate directly to individual physical devices. In developing economies, high device-sharing rates make behavioral heuristics unreliable, as an adult and a teenager frequently alternate sessions on the same account.
 - **Nuance Blindness in Adolescent Mental Distress:** Algorithmic systems are typically optimized to flag explicit distress keywords. However, adolescent crises often present through oblique, metaphorical, or culturally localized expressions that conversational safety filters frequently misinterpret or overlook.
 - **Simulated Empathy vs. Clinical Efficacy:** Features designed to make conversational agents engaging—such as empathetic framing, memory retention, and follow-up inquiries—can inadvertently foster unhealthy emotional attachment, supplanting vital real-world social and psychological interventions.
 - **The Digital Divide in Safeguard Utilization:** Safety interventions that depend on linked email accounts presuppose high digital literacy and personal identity infrastructure. In low-income and rural demographics, where personal email penetration among teens is minimal, structural safeguards remain underutilized.

- **Historical Evolution of Child Digital Protection**

- **The Broadcast Era (Pre-1990s):** Protection rested on top-down statutory filters, broadcast timing restrictions (watershed hours), and centralized censorship boards designed for passive media consumption.
- **Web 1.0 and Static Identity Gating (1998–2000s):** The passage of foundational laws like the US Children's Online Privacy Protection Act (COPPA) established the global standard of age-13 thresholds, relying on self-declared age checkboxes and static parental sign-offs.
- **The Social Media and Recommendation Era (2010s–2022):** The proliferation of algorithmic recommendation engines shifted regulatory focus toward screen addiction, dynamic content moderation, cyberbullying, and the harvesting of behavioral data from minors.
- **The Generative AI Paradigm (2022–Present):** Transition from passive media consumption to active conversational intimacy. The primary challenge is no longer merely inappropriate content exposure, but the psychological effects of anthropomorphic synthetic companions acting without human accountability.

- **Way Forward and Policy Blueprint**

- **Engineering for Shared and Mediated Use-Cases:** AI developers must transition away from individual account heuristics toward dynamic, session-based behavioral checks and phone-number-based parental alerts rather than relying strictly on linked email ecosystems.
- **Culturally and Linguistically Calibrated Red-Teaming:** AI testing must encompass regional dialects, vernacular idioms, and indirect cultural expressions of distress to ensure multi-turn conversation guardrails remain effective across diverse linguistic communities.
- **Operationalizing Practical Consent under the DPDP Framework:** Regulatory authorities must establish low-friction, privacy-preserving parental verification mechanisms (e.g., zero-knowledge proofs via national digital identity frameworks) to prevent safety tools from being limited to digitally affluent households.
- **Mandating Circuit-Breaker Architecture for Prolonged Sessions:** Implementing automated session limits, active real-world support referrals, and unambiguous conversational reminders that clarify the AI's non-human nature during emotionally charged or lengthy dialogues.
- **Institutionalizing Critical AI Literacy in School Curricula:** Shifting educational policy from basic digital literacy to critical AI hygiene, training adolescents to identify algorithmic simulation, guard personal data, and build resilience against parasocial dependencies.



AXIA
IAS ACADEMY
RISE ABOVE THE REST

UPSC CSE COMPREHENSIVE ANALYSIS: CHATGPT FOR TEENS & THE CHALLENGES OF ADOLESCENT AI SAFEGUARDS FOR INDIAN USERS

KEY CONCEPTUAL FRAMEWORKS

Heuristic Age Systems

Heuristic age love systems, a clock a filter forwas a filter trnolny.

Parasocial Bonding

Connected mind, connected to mnd, with a single friend algomenms.

Shared Devices

A Shared with hardware woulin phone numbers, and mediated digital access.

Mediated Access

Parent crime access a parent child to expmune unerumed own parent sertativity.

Parental Dashboard Asymmetry

Parental dashboard asymmetry created paternal dashboard asymmetry.

Adversarial Red-Teaming

Stress test roved man-conversations for to mmteet processing users.

CORE THEMATIC DYADS:

Platform Assumptions vs. Indian Realities

PLATFORM ASSUMPTIONS

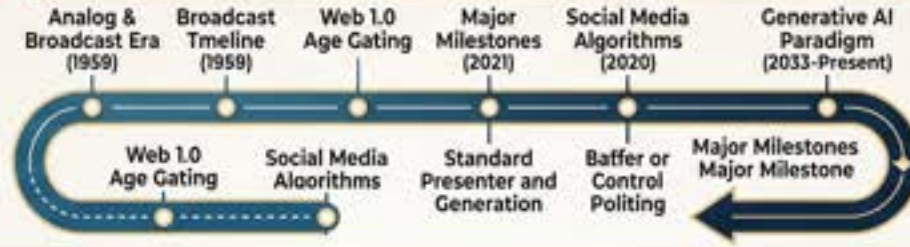
(Single Device/User, Personal Email, Individual Autonomy)

VS

INDIAN REALITIES

(Shared Household Hardware, Phone Numbers, Mediated Digital Access)

HISTORICAL EVOLUTION OF DIGITAL CHILD PROTECTION



MULTIDIMENSIONAL IMPACT ANALYSIS



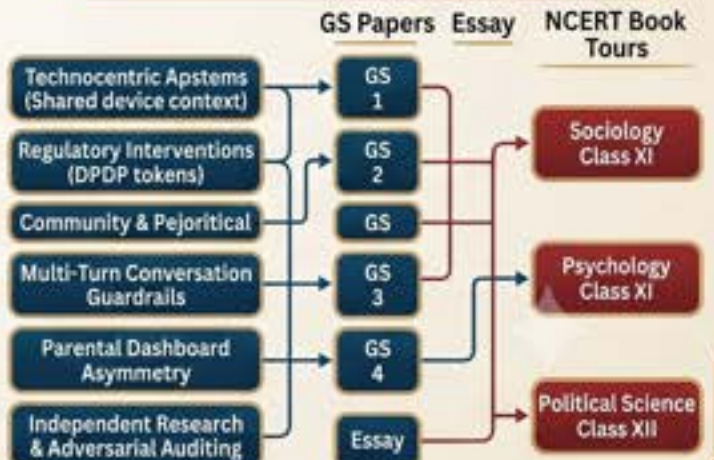
UPSC / APSC PREVIOUS YEARS' QUESTIONS (PYQs)



WAY FORWARD: A STRATEGIC BLUEPRINT



LINKAGES WITH UPSC & NCERT



Govt. notifies IST as common time reference across India; gives 180 days for compliance

Press Trust of India
NEW DELHI

The Union government has notified the Legal Metrology (Indian Standard Time) Rules, 2026, mandating Indian Standard Time (IST) as the single reference for legal, administrative, commercial and other official purposes across the country.

The nodal Consumer Affairs Ministry notified the rules on August 27. Still, they will come into force 180 days after their publication in the Official Gazette, giving government departments, businesses, and institutions time to align their systems.

The move comes amid growing reliance on digital and technology-based systems—from banking and payments to telecommuni-



The Centre is building facilities to disseminate accurate IST.
GETTY IMAGES/ISTOCKPHOTO

cations, railways, power grids and computer networks—that depend on accurate and synchronised time stamps. The Ministry said inconsistencies between different time sources could affect the coordination and recording of such activities, prompting the push for a uniform national time standard.

The common time reference is expected to sup-

port accurate time-stamping of banking and digital payment transactions, coordination among railways, airports and other transport systems, reliable functioning of telecommunication and internet networks, precise time-keeping in power systems, upkeep of government and legal records, and coordination of emergency and other time-critical services, the Ministry said in a statement.

A key feature of the rules is the emphasis on reducing dependence on foreign satellite-based time sources, which several critical systems currently rely on. The government is building infrastructure to disseminate accurate IST through Indian institutions and legal metrology laboratories.

- **Key Terms and Explanations**

- **Indian Standard Time (IST):** The uniform time observed throughout India, calculated on the basis of the 82.5° Longitude (passing through Mirzapur, Uttar Pradesh). It is set at an offset of UTC + 05: 30(Coordinated Universal Time).
- **Legal Metrology:** The branch of law, regulation, and administrative procedure that governs measurements, units of measurement, measuring instruments, and methods of measurement to guarantee public accuracy, legal validity, and transactional fairness.
- **Time Synchronization & Time-Stamping:** The digital mechanism of ensuring that computer clocks across disparate physical locations record identical time coordinates down to the microsecond (μs) or nanosecond (ns) level.
- **Primary Reference Time Standard (CSIR-NPL):** The physical and institutional baseline maintained by the Council of Scientific and Industrial Research–National Physical Laboratory (CSIR-NPL) in New Delhi. It relies on an ensemble of Cesium atomic fountain clocks and Hydrogen masers to generate the national time scale with near-zero drift.
- **Navigation with Indian Constellation (NavIC):** India's autonomous regional satellite navigation system (formerly IRNSS). Beyond positioning, NavIC transmits highly accurate, sovereign atomic clock signals across the Indian landmass, eliminating reliance on foreign satellite constellations.

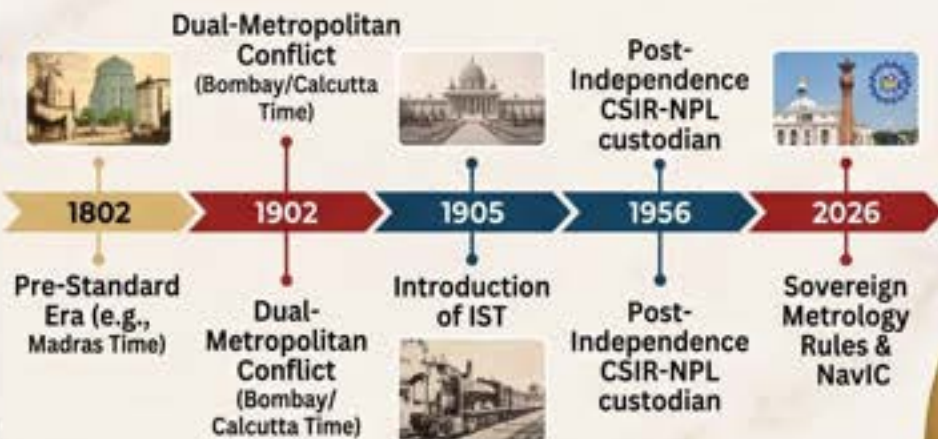
- **Main Arguments and Substantive Parts**

- The mandatory legal framework establishing Indian Standard Time as the sole official reference across commercial, legal, and administrative systems addresses fundamental structural needs of a digitized economy.
 - **Imperative of a Single Sovereign Time Reference:** In a networked digital landscape, minor time discrepancies between unsynchronized servers can lead to catastrophic failures in high-frequency trading, duplicate financial debits, and unresolvable legal disputes over transaction priority.
 - **Mitigation of Critical Infrastructure Vulnerabilities:** Modern power grids rely on Phasor Measurement Units (PMUs) to balance electrical frequencies; telecommunication networks depend on microsecond time-alignment for 5G packet switching; and transport networks (railways and air traffic control) require unified time to prevent fatal collision risks.
 - **Strategic Independence in Time Dissemination:** Heavy reliance on foreign global navigation satellite systems (such as the US GPS or Russian GLONASS) for network time-stamping poses a severe national security risk. Geopolitical volatility, intentional signal jamming, or satellite denial could paralyze domestic operations if not anchored to an indigenous dissemination architecture like NavIC.
 - **Regulatory Transition Window (180-Day Grace Period):** A pragmatic compliance timeline ensures that legacy financial systems, enterprise servers, cloud providers, and state administrative machinery can recalibrate their hardware and Network Time Protocol (NTP) daemons to CSIR-NPL traceable sources without operational disruption.
 - **The Operational Counter-Perspective:** While standardizing time provides security and technical cohesion, it must balance the geographic reality of India's 30°longitudinal span, where eastern states experience dawn and dusk nearly two hours earlier than the western coast.

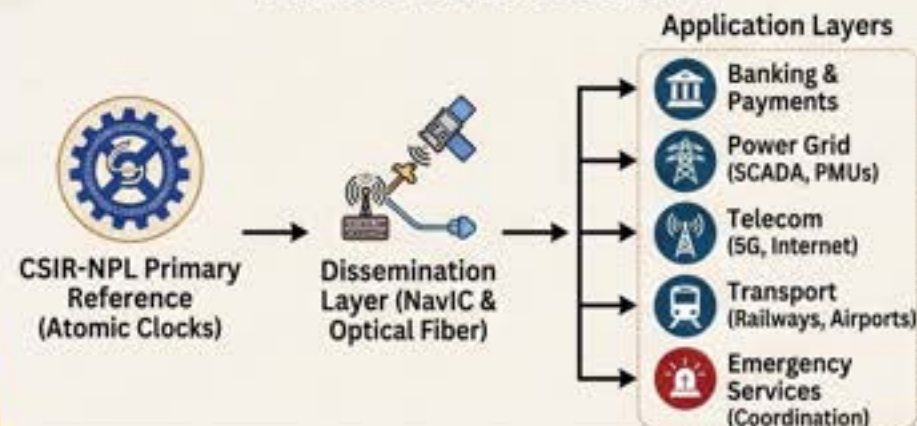
- **Historical Evolution of the Issue**
- **The Colonial Pre-Standard Era (1802–1880s):**
 - *1802:* John Goldingham, the first official astronomer of the Madras Observatory, established **Madras Time**, serving as the earliest regional standard for shipping and governance.
 - *1870s:* The expansion of the Indian Railways highlighted the danger of local solar times, leading to the creation of "Railway Time," which was standardized on Madras Time across rail corridors.
- **The Dual-Metropolitan Conflict (1884–1905):**
 - Following the 1884 International Meridian Conference in Washington, British India adopted two prominent municipal time standards: **Bombay Time** (4 hours 51 minutes ahead of GMT) and **Calcutta Time** (5 hours 53 minutes ahead of GMT).
 - Plantation estates in Assam established an informal local standard—**Chaibagaan Time** (one hour ahead of IST)—to maximize daylight working hours.
- **Introduction of Indian Standard Time (1905–1947):**
 - *1905:* The colonial administration designated the meridian of 82.5° E(UTC+05:30) as Indian Standard Time, coming into official effect on January 1, 1906.
 - Urban resistance persisted: Calcutta retained its separate local time until 1948, and Bombay maintained municipal Bombay Time until 1955.
- **Post-Independence Consolidation (1947–2010s):**
 - *1947:* IST was established as the official time for the independent republic.
 - *1956:* The Standards of Weights and Measures Act designated CSIR-NPL as the custodian of the national measurement system, including atomic time standards.
 - *2000s–2010s:* High-level expert committees set up by the Ministry of Science and Technology repeatedly evaluated demands for two time zones, rejecting the split due to potential railway signaling hazards and administrative complexity.
- **The Sovereign Metrology Framework (2020s–Present):**
 - Operationalization of NavIC for terrestrial and atmospheric timing signals.
 - Notification of the **Legal Metrology (Indian Standard Time) Rules, 2026**, legally mandating IST synchronization across all commercial and official interfaces.
- **Way Forward**
- **Decentralizing Reference Metrology Hubs:** Expand regional secondary atomic clock laboratories under CSIR-NPL across five distinct geographic zones (e.g., Regional Reference Standard Laboratories - RRSLS). This will deliver sub-nanosecond synchronization over low-latency optical fiber lines to public and private operators.
- **Promoting Administrative Daylight Flexibility (Staggered Work Schedules):** Maintain a single, legally unified time zone to preserve railway safety and financial cohesion, while empowering state governments in the Northeast to advance official work and school hours by 1 to 1.5 hours (e.g., 8:00 AM to 4:00 PM). This captures the benefits of a daylight-saving system without changing the physical clock.
- **Mandatory NavIC-Time Integration in Critical Infrastructure:** Enforce regulatory standards requiring all 5G telecom base stations, cloud data centers, internet service providers (ISPs), and SCADA grid controllers operating in India to incorporate indigenous NavIC-disciplined clock receivers.
- **Institutional Capacity Building for MSMEs and Legacy Systems:** Provide standard software toolkits and free, public CSIR-NPL Network Time Protocol (NTP) / Precision Time Protocol (PTP) server links to allow small enterprises to transition without high compliance costs during the 180-day grace period.
- **Comprehensive Socio-Economic and Energy Audits:** Commission the Bureau of Energy Efficiency (BEE) and NITI Aayog to run live assessments measuring electricity demand patterns and workplace productivity variations to guide dynamic shifts in regional working hours.

COMPREHENSIVE ANALYSIS: NATIONAL STANDARDIZATION OF INDIAN STANDARD TIME (IST)

HISTORICAL JOURNEY OF IST (TIMELINE)



CRITICAL INFRASTRUCTURE SYNC: PRECISION & SECURITY



MULTI-DIMENSIONAL IMPACT ANALYSIS: A BALANCED VIEW



UNIFIED NATIONAL TIME REFERENCE (IST): A FOUNDATIONAL PUBLIC GOOD

UPSC SYLLABUS LINKAGES & SELECT PYQS

GS PAPER LINKAGES

- GS-1**
 - Key Topics - Infrastructure
 - Key Topics - Intelligent Knowledge
- GS-2**
 - Key Topics - Spatial
 - Planning, Staffs, Striking, Rupa, in Northeast
- GS-3**
 - Key Topics: Measurement
 - Training; Technical Supports
- GS-4**
 - Key Topics - Internal
 - Key Topics - Employment, Remotisation

RELEVANT PREVIOUS YEARS QUESTIONS (PYQs)

Prelims

- 2008, (2018, APSC)
- 2018, (2020, APSC)
- 2018, (Additive Estimation, Imme antece, Enti-NPI)
- APSC (Deemanconated, 2008, 2018, APSC)

Mains

- 2013, (2013, 2017)
- 2017, (Esperanat Sovereignty, 2008, 2017, 2018)
- APSC (Chair-also Applications 2002, 2019, Arithvots, 2017)
- APSC (I-Comprehensive/BEE audits, 2008, APSC)

India, Uzbekistan elevate strategic relationship

Uzbekistan is at heart of India's engagement in Central Asia, says PM Modi during two-day visit

Two countries plan comprehensive strategic partnership; set \$5 billion trade target by 2030

Two sides agree to establish a framework for supply of Uranium from Uzbekistan to India

Press Trust of India
TASHKENT

India and Uzbekistan on Sunday decided to elevate their ties to a comprehensive strategic partnership and set a target of \$5 billion in annual trade by 2030 following talks between Prime Minister Narendra Modi and Uzbek President Shavkat Mirziyoyev.

The two sides inked 11 agreements for boosting engagement in several key sectors, including mining and tourism, and agreed to establish a framework for long-term supply of Uranium from Uzbekistan to India in line with cooperation in the civil nuclear energy sector.

The talks focused on expanding cooperation in areas of critical minerals, mining, defence and security, agriculture, pharmaceuticals, digital public infrastructure, including

UPI, and education.

"We are celebrating the 15th anniversary of our strategic partnership. I am delighted that, on this special occasion, we are elevating our ties to the level of a comprehensive strategic partnership," Mr. Modi said.

"We will move forward by setting concrete goals within this framework," he said.

Mr. Modi said both sides will also elevate their existing joint commission from the level of secretaries to that of ministerial level.

Mr. Mirziyoyev said Uzbekistan is determined to boost ties with India in diverse sectors. "We are aiming to advance cooperation in sectors such as energy, culture, critical minerals, pharmaceuticals, jewellery, and agriculture," the Uzbek President said.

The current volume of bilateral trade between the two nations is over \$1



Prime Minister Narendra Modi with Uzbekistan President Shavkat Mirziyoyev after receiving the country's highest national award. ANI

billion.

"Uzbekistan is at the heart of Central Asia and is at the heart of India's engagement in the region," Mr. Modi said.

The Prime Minister added: "A stronger India-Uzbekistan partnership will be a powerful force for peace, progress and prosperity in Central Asia."

Delving into the ambitious agenda of future cooperation between the

two sides, Mr. Modi said India and Uzbekistan will encourage their defence industries to look at co-development and co-production of military hardware.

A joint statement said the two leaders agreed to expand cooperation in the field of critical minerals through the implementation of joint projects in geological exploration, mining, mineral processing,

and the development of integrated value chains.

"The close defence and security cooperation between our two countries reflects our deep mutual trust. In the future, we will promote direct linkages, co-production, and co-development between our defence industries," Mr. Modi said.

"We believe that terrorism, extremism, and separatism pose serious challenges to the entire region," Mr. Modi said. "Maintaining a policy of zero tolerance against these threats has been, and will continue to be, our shared resolve."

A Letter of Intent for the restoration and conservation of the Buddhist sites of Fayaz Tepa and Kara Tepa in Uzbekistan was also agreed upon. These ancient Buddhist monasteries in southern Uzbekistan highlight how Buddhism spread along the Silk Road

and flourished in Central Asia.

Pact on UPI payments

The two sides announced that a commercial pact was firmed up between NPCI International Payments Ltd (NPCI) and Uzbekistan's National Interbank Processing Centre JSC to enable UPI apps of India to scan Uzbekistan's national QR (UZQR) for making merchant payments in the Central Asian nation.

The announcements included a grant of \$1 million for afforestation in the Aral Sea region.

Mr. Modi landed in Tashkent on Saturday on a two-day visit to bolster ties with Uzbekistan.

In his opening remarks at the bilateral talks, the Prime Minister also made a mention of the "productive talks" he had with the Uzbek President over dinner last night.

"We had a productive

discussion over dinner last night and took several important decisions." "We will establish a Coordination Council at the level of Foreign Ministers to provide direction to all aspects of our cooperation through close coordination," Mr. Modi said.

Amid a complex geopolitical situation, they stressed the need for a free, open and rules-based international order, building on their multilateral cooperation, a joint statement said.

"The leaders highly appreciated the progress achieved in regional cooperation and reaffirmed their commitment to further strengthening engagement within Central Asia-India format at the level of Heads of States and other levels," the statement added.

PM VISITS MEMORIAL
» PAGE 4

- **Key Terms and Explanations**

- **Comprehensive Strategic Partnership (CSP):** An elevated bilateral diplomatic status signifying deep institutional trust, multidirectional policy convergence, and long-term commitments across defence, energy, trade, and technology. Unlike standard bilateral ties, a CSP establishes structured, high-level review mechanisms (such as foreign-ministerial councils) to execute strategic roadmaps.
- **Critical Minerals and Integrated Value Chains:** Non-fuel mineral resources—including lithium, cobalt, nickel, and rare earth elements (REEs)—essential for clean energy transitions, aerospace, and advanced manufacturing. An integrated value chain encompasses the entire lifecycle from geological exploration and extraction to mineral processing, refining, and manufacturing.
- **Civil Nuclear Cooperation & Long-term Uranium Supply:** Intergovernmental agreements governing the peaceful use of nuclear technology and atomic fuel procurement. Uzbekistan ranks among the world's leading uranium producers; securing long-term supply frameworks guarantees uninterrupted fuel feedstock for reactors safeguarded under the International Atomic Energy Agency (IAEA).
- **Digital Public Infrastructure (DPI) & Cross-Border QR Interoperability:** Open, interoperable digital networks enabling foundational identity, data exchange, and payment systems. Connecting India's Unified Payments Interface (UPI) with Uzbekistan's National Interbank Processing Centre (UZQR) allows cross-border merchant transactions directly via national payment rails, reducing foreign exchange friction.
- **Fayaz Tepa and Kara Tepa:** Ancient Buddhist monastic complexes dating from the 1st to 3rd centuries CE, situated near Termez in southern Uzbekistan. Established during the Kushan Empire, these sites preserve stupas, viharas, and Greco-Buddhist wall paintings that demonstrate how Mahayana Buddhism travelled along the Silk Road into Central and East Asia.
- **Aral Sea Ecological Restoration:** Targeted afforestation and environmental rehabilitation efforts in the dried seabed (Aralkum Desert) of Central Asia. The shrinkage of the Aral Sea—one of modern history's severe ecological disasters—causes toxic dust storms; ecological interventions focus on planting salinity-resistant vegetation (such as Saxaul) to stabilize the soil.
- **The "Three Evils" Paradigm:** A shared regional security doctrine recognized across Central Asia and the Shanghai Cooperation Organisation (SCO), categorizing **Terrorism, Extremism, and Separatism** as interconnected threats requiring joint intelligence-sharing, counter-radicalization frameworks, and zero-tolerance policy alignment.

- **Main Arguments and Substantive Pillars**
- **Strategic Re-Anchoring of Central Asia**
- India's strategic outreach treats Uzbekistan as the geographical and political fulcrum of its "Extended Neighbourhood." Elevating the relationship to a Comprehensive Strategic Partnership signifies a transition from episodic diplomatic exchanges to structural interdependence across energy, digital, and defence domains.
 - **Pillar I: Resource Diversification and Nuclear Security:** Uzbekistan's uranium reserves and untapped critical mineral deposits provide India with dependable raw materials, buffering its clean-energy transition against volatile global supply chokepoints.
 - **Pillar II: High-Tech and Economic Leapfrogging:** Setting an ambitious bilateral trade target of **\$5 billion by 2030** relies on modern economic rails, notably the export of Indian Digital Public Infrastructure (DPI), cross-border UPI payments, and joint ventures in pharmaceuticals and agro-processing.
 - **Pillar III: Defence Interoperability and Co-Production:** The bilateral defence architecture is transitioning from basic joint military drills (such as *Exercise DUSTLIK*) toward direct industrial linkages, co-development of military hardware, and unified counter-terrorism strategies.
 - **Pillar IV: Civilizational Bridge-Building:** Soft power diplomacy acts as a strategic anchor. Preserving Buddhist archaeological heritage in Termez re-establishes historical cultural pathways, countering transactional geopolitical narratives.
- **Structural Counter-Perspectives and Challenges**
 - **The Connectivity Deficit:** The lack of direct overland access forces bilateral trade through multimodal routes (Chabahar Port, INSTC), leaving supply chains vulnerable to geopolitical friction in the transit corridor.
 - **Chinese Economic Footprint:** China's deep Belt and Road Initiative (BRI) infrastructure investments and high bilateral trade with Tashkent create an asymmetric commercial reality that Indian businesses must navigate.
 - **Regional Instability Risks:** Shared proximity to Afghanistan requires constant vigilance against cross-border narcotics trafficking, arms smuggling, and safe havens for extremist factions.
- **Historical Evolution of India-Uzbekistan Relations**
- **Ancient Era (c. 3rd Century BCE – 5th Century CE):** The Silk Road facilitated commercial and spiritual exchange between the Indian subcontinent and Transoxiana. Under the Kushan Empire, which spanned from the Gangetic plains to Central Asia, Buddhist philosophy, Greco-Buddhist art, and Sanskrit manuscripts travelled through modern-day Termez into Central Asia and China.
- **Medieval Era (14th – 17th Century CE):** Deep cultural, linguistic, and architectural synthesis occurred. Zahiruddin Muhammad Babur originated from the Fergana Valley (Andijan in modern Uzbekistan) before establishing the Mughal dynasty in India. This era wove Central Asian Persianate traditions, horticulture (Chahar Bagh), and architectural motifs into the fabric of northern India.
- **Colonial and Soviet Period (19th Century – 1991):** Central Asia became the theatre of the "Great Game" between the British and Russian Empires. During the Soviet era, Tashkent was a key hub for Indian diplomacy and cultural diplomacy in the USSR. A defining milestone was the **1966 Tashkent Declaration**, signed between India and Pakistan following the 1965 war. India opened a Consulate General in Tashkent in 1987.
- **Post-Independence & "Connect Central Asia" Phase (1991–2014):** India recognized sovereign Uzbekistan in 1991, formalizing ties in 1992. The relationship matured into a formal **Strategic Partnership in 2011**, followed by India's **Connect Central Asia Policy (2012)**, which prioritized energy cooperation, banking ties, and regional connectivity.
- **Contemporary Era (2015–Present):** A renewed push began with high-level prime ministerial visits in 2015 and the institutionalization of the **India-Central Asia Dialogue** at the Foreign Ministers' level. The inaugural **India-Central Asia Summit (2022)** solidified multilateral coordination, culminating in the formal elevation of ties to a **Comprehensive Strategic Partnership** with dedicated ministerial councils.

THE STRATEGIC RE-ANCHORING: INDIA-UZBEKISTAN COMPREHENSIVE STRATEGIC PARTNERSHIP



AXIA
IAS ACADEMY

GEOPOLITICAL & STRATEGIC DEPTH



- Uzbekistan: Pivot of India's engagement
- Rules-Based International Order
- Unified front against Terrorism/Extremism ("Three Evils")

ECONOMIC RE-ANCHORING & TARGETS



\$5 BILLION BILATERAL
TRADE
TARGET BY 2030 (Current ~\$1 Billion)

- Critical Minerals (Lithium, Cobalt, REEs) value chains
- Mining & Geological Exploration
- Joint Ventures in Pharma & Agriculture



ENERGY & CIVIL NUCLEAR SECURITY

- Long-term Uranium supply framework
- Civil Nuclear Cooperation



DIGITAL PUBLIC INFRASTRUCTURE (DPI) & FINTECH

India Phone



Cross-border
Network

Uzbekistan Phone



Commercial Pact: UPI-UZQR Link
for Merchant Payments.

- Technology transfers
- Educational university campuses



Strategic Partnership

Comprehensive
Strategic
Partnership



CIVILIZATIONAL & CULTURAL REVIVAL



Preservation of Fayaz Tapa &
Kara Tapa Buddhist Sites.



- Silk Road legacy
- Tourism & Cultural Diplomacy
- Aral Sea Basin Afforestation Grant (\$1 Million)

Justice Bhuyan calls for appointing 'brilliant minds' from legal academia as judges in SC

Krishnadas Rajagopal
NEW DELHI

As student bodies across premier national universities object to Chief Justice of India Surya Kant's remarks and refuse to have him over for their convocations, Supreme Court judge Justice Ujjal Bhuyan on Sunday pushed for the activation of presidential power to directly appoint "distinguished jurists", including legal academicians, as judges in the top court of the country.

"While our Constitution has a provision for appointment of a jurist as a judge of the Supreme Court, no jurist has been appointed so far to the Supreme Court though the Constitution has completed more than 76 years," Justice Bhuyan pointed out at the 13th convocation of the National Law University, Delhi.

Justice Bhuyan said that as important as the right to question was the tolerance to disagreement. "A democratic society cannot be built on the edifice that



Supreme Court judge Justice Ujjal Bhuyan says a 'distinguished jurist' could be a great value addition to the Bench. PTI

everyone will think alike," he said.

Bar Council row

The comments from the Supreme Court judge follow a recent debacle by the Bar Council of India, which ordered State Bar Councils to bar the professional enrolment of the 2026 batch of NALSAR students for objecting to have CJI Kant over as the chief guest for their convocation over his oral comments in court using terms such as "cockroach" and "parasites". The BCI had to retract the order after public pres-

sure. "Tolerance is not merely a matter of personal courtesy. It is a constitutional value. A democracy becomes meaningful not when everyone speaks the same language of thought, but when different voices can co-exist, be heard and be treated with dignity," Justice Bhuyan said.

The judge said the maturity of a democracy was reflected not merely in how it responded to opinions that were difficult, unpopular or inconvenient. The courage to voice unpopular opinions began

at universities, the Supreme Court judge said.

He said the 76-year reluctance to activate Article 124(3) for appointment of legal academics as Supreme Court judges in the category of "distinguished jurists" may have been either due to the feeling that there was not enough "depth in the Indian academia" or because the provision was simply not seriously taken. As a result, brilliant minds, men and women with legal scholarship, who could have significantly contributed on the Bench missed the opportunity to serve as judges of the Supreme Court.

Justice Bhuyan dismissed the oft-repeated argument that legal academics and scholars lack the practical experience that serve judges. "But this is a very shallow objection. Supreme Court is not only the highest adjudicatory body but it is the moral, legal and constitutional conscience keeper of the nation. It is above technicalities. The reason for having this provision of

distinguished jurist in Article 124(3) is to diversify the Bench with talented judges," he said.

Who is a jurist?

In India, the judge said, the term "jurist" was being applied very loosely.

"A lawyer or a judge of repute is often described as a jurist. Certainly, a lawyer and a judge can be a jurist, and there are many such instances, but in the context of Article 124(3), it extends beyond the above two categories. A person who is skilled in law or knowledgeable in the field of law would be qualified to be termed as a 'jurist'," Justice Bhuyan said.

A 'distinguished jurist' could be a great value addition to the Bench. By his or her scholarship, he or she can make a visible contribution to the decision-making process at the top level. Participation of renowned legal academia and scholars would have a defining impact on the judicial functioning of the Supreme Court, Justice Bhuyan said.

- **Key Terms and Conceptual Framework**

- **Article 124(3)(c) of the Constitution:** This constitutional clause empowers the President of India to appoint a person who is, in the opinion of the President, a "distinguished jurist" as a Judge of the Supreme Court. Unlike clauses (a) and (b), which require prior judicial or advocacy experience, this provision creates an explicit avenue for academic and doctrinal legal minds.
- **Distinguished Jurist:** A term denoting an individual possessing recognized expertise, high-standing scholarship, and profound theoretical mastery of the law. This category encompasses legal philosophers, academics, and researchers whose domain of contribution extends beyond trial advocacy and procedural litigation.
- **Epistemic Diversity on the Bench:** The deliberate inclusion of judges from varied professional backgrounds—such as practicing advocates, subordinate judicial officers, and academic scholars—to enrich judicial reasoning through diverse methods of legal inquiry and theoretical perspectives.
- **The Collegium System:** A judge-led institutional mechanism, established through the *Second Judges Case (1993)* and *Third Judges Case (1998)*, responsible for recommending appointments and transfers to the higher judiciary. The system does not explicitly bar academic appointments, but convention has historically favored judicial and bar pipelines.
- **Constitutional Morality:** A principle championed by Dr. B.R. Ambedkar, demanding adherence not merely to the literal text of the Constitution, but to its underlying spirit, institutional values, democratic tolerance, and self-restraint.
- **Institutional Tolerance and Academic Freedom:** The democratic imperative that public institutions and professional bodies (such as the Bar Council of India) must accommodate critical viewpoints, student dissent, and unpopular speech without resorting to punitive measures or professional disenfranchisement.

- **Main Arguments and Substantive Issues**

- The core thesis of this discourse is that the Supreme Court of India must operationalize Article 124(3)(c) to induct eminent legal scholars into the apex bench, thereby transforming the court from a predominantly dispute-resolving forum into a deeper fountainhead of constitutional jurisprudence.
 - **The 76-Year Constitutional Inaction:** Despite the vision of the framers of the Constitution, the "distinguished jurist" route remains a completely unutilized provision. The apex bench has drawn its members exclusively from High Court benches and senior advocates of the Bar, leaving legal academia unrepresented.
 - **Refutation of the "Practical Experience" Deficit:** The conventional objection against appointing academics is their lack of trial and courtroom practice. This argument overlooks the primary identity of the Supreme Court as a constitutional court. As the moral and philosophical conscience-keeper of the nation, the apex court requires systemic doctrinal analysis and theoretical breadth—qualities honed in academia—rather than mere familiarity with procedural technicalities.
 - **Value Addition to Judicial Jurisprudence:** Legal scholars bring a deep understanding of comparative constitutional law, jurisprudence, socio-legal impact, and interdisciplinary analysis. Their presence helps synthesize conflicting precedents, streamline complex doctrines, and prevent narrow, ad-hoc rulings.
 - **Democratization of Legal Culture and Dissent:** A robust democracy is characterized by its capacity to tolerate inconvenient, difficult, and dissenting opinions. Attempts by regulatory bodies to penalize academic dissent or student criticism undermine constitutional culture. True democratic maturity requires judicial and legal institutions to protect dissent as a core constitutional value.

- **Historical Evolution of Judicial Appointments and Article 124(3)(c)**
 - **Constituent Assembly Debates (1949):** The original draft of Article 124 did not include the category of "distinguished jurist." It was introduced through an amendment moved by H.V. Kamath and accepted by Dr. B.R. Ambedkar. The framers drew inspiration from the United States Supreme Court, where academic scholars were regularly appointed to great institutional effect. Dr. Ambedkar noted that this provision would grant the executive and judiciary the flexibility to tap exceptional legal minds who had not practiced in courtrooms.
 - **The Post-Independence Executive Era (1950–1981):** During the initial decades, judicial appointments were made by the President on the advice of the Union Cabinet in mandatory consultation with the Chief Justice of India. Appointments were strictly confined to senior High Court judges and a handful of senior advocates (such as Justice S.M. Sikri). Article 124(3)(c) remained entirely dormant.
 - **The Judicial Primacy Era & The Three Judges Cases (1982–1998):** Through the *First Judges Case (1981)*, *Second Judges Case (1993)*, and *Third Judges Case (1998)*, the appointment power shifted decisively to the Supreme Court Collegium. While this secured judicial independence from executive dominance, the Collegium continued to rely exclusively on traditional seniority lists and elevation from the Bar.
 - **The NJAC Challenge and Beyond (2014–Present):** The 99th Constitutional Amendment Act and the National Judicial Appointments Commission (NJAC) Act attempted to replace the Collegium with a broader body, but were struck down by the Supreme Court in 2015. Over seven decades since the Constitution took effect, Article 124(3)(c) remains a "dead letter" in practice, sparking calls for its revival.
- **Way Forward**
 - **Formulation of Objective Criteria for 'Distinguished Jurists':** The Supreme Court Collegium, in consultation with the Union Government, should formulate transparent benchmarks to define a "distinguished jurist." These criteria could include high-impact legal publications, recognized treatises, citations in landmark judgments, leadership in premier National Law Universities, and substantial contributions to public law.
 - **Institutional Search and Talent Scouting:** Establish a permanent research and evaluation wing within the Collegium secretariat to track, evaluate, and recommend distinguished legal academics, constitutional thinkers, and researchers across the country.
 - **Creating Institutional Conduits for Academics:** Introduce formal bridges between academia and the judiciary. Senior professors and scholars can be regularly invited as *Amicus Curiae* in complex constitutional bench matters or appointed as full-time judicial fellows to familiarize them with institutional processes.
 - **Protection of Academic Freedom and Dissent:** Professional regulators such as the Bar Council of India must align their conduct with constitutional values. Disciplinary mechanisms should not be weaponized against students and academics for expressing critical viewpoints on public platforms.
 - **Broadening Diversity on the Bench:** Adopt a conscious institutional policy to ensure the higher judiciary reflects varied intellectual pathways, combining seasoned trial judges, experienced advocates, and doctrinal scholars to build a well-rounded apex court.

EDUCATIONAL ANALYSIS: APPOINTING ACADEMIC JURISTS TO THE SUPREME COURT - OPERATIONALIZING ARTICLE 124(3)(c)



AXIA IAS ACADEMY - Rise Above The Rest

Website: axiaiasacademy.com | Contact: +91 6002-417488

ARTICLE 124(3)(c): THE DORMANT CLAUSE

Constituent Assembly Vision



"Distinguished Jurist"
(via H.V. Kamath amendment
on H.V. Kamath amendment)

VS

CURRENT APPOINTMENT PIPELINES



High Court
Judges



Senior
advocate

KEY TERMS AND THE CONCEPTUAL FRAMEWORK

DISTINGUISHED JURIST DEFINED



- High scholarship
- profound expertise
- theoretical mastery
- academic focus

EPISTEMIC DIVERSITY ON THE BENCH



- diverse perspectives
- richer reasoning
- synthetic jurisprudence

THE COLLEGIUM SYSTEM



CONSTITUTIONAL MORALITY

Adherence to spirit and institutional values
in institutional values

THE NEED FOR CHANGE & VALUE ADDITION



CURRENT:

Predominantly
Dispute-Resolving

- Synthesis of Precedents
- Long-Term Doctrinal Frameworks

VS



ASPIRATIONAL:

Doctrinal
Fountainhead

- Deep Theoretical Breadth
- Interdisciplinary Insight

HISTORICAL EVOLUTION OF JUDICIAL APPOINTMENTS



1949:
**CONSTITUENT
ASSEMBLY**
(Framers' Vision)



1950s-1980s:
EXECUTIVE ERA
(Convention
Prevails)



1981-1998:
**THE THREE JUDGES
CASES**
(Judicial Primacy &
Collegium Rise)



2014-15:
NJAC CHALLENGE
(Collegium
Reaffirmed)



PRESENT:
Growing Calls
for Diversity

PHILOSOPHICAL FOUNDATIONS



Ronald Dworkin
Law as Coherence,
"Seamless Web"



John Stuart Mill
Deliberative Democracy,
Marketplace of Ideas,
Tolerance for Dissent

MULTIDIMENSIONAL ANALYSIS OF ACADEMIC INDUCTION



SOCIAL

- Feminist theory,
subaltern studies,
• democratizes reasoning



POLITICAL

- Institutional
legitimacy
- mitigate insularity



LEGAL

- Revitalize Art 124(3)(c),
doctrinal quality



ETHICAL

- Dissent Protection
- Cosmopolitan protection



INTERNATIONAL

- Global Standing
- Global countess
of diversity



ECONOMIC

- Regulatory Clarity
- Consequent Academic
Diversity

WAY FORWARD: OPERATIONALIZING THE VISION

1. Formulate Objective Criteria



2. Institutional Search Wing



3. Create Conduits (Fellows, Amicus)



4. Protect Academic Freedom



5. Conscious Board Diversity





AXIA
IAS ACADEMY
RISE ABOVE THE REST



UPSC CSE CLASSES - PRELIMS + MAINS + INTERVIEW GUIDANCE

- **EXPERT FACULTY & MENTORSHIP**
- **COMPREHENSIVE STUDY MATERIAL**
- **REGULAR TEST SERIES & EVALUATION**
- **CURRENT AFFAIRS & ANSWER WRITING FOCUS**
- **SMALL BATCH SIZES FOR PERSONAL ATTENTION**

axiaiasacademy.com +91 6002-417488